



University of Hawaii at Manoa

Hawaii Natural Energy Institute

Holmes Hall 246 • 2540 Dole Street • Honolulu, Hawaii 96822

October 26, 1990

Mr. Duane Kanuha
Director
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

DIV. OF WATER &
LAND DEVELOPMENT

90 OCT 29 P 3: 51

RECEIVED

Dear Mr. Kanuha:

As required in the County of Hawaii Planning Commission's geothermal resources permit (GRP 89-1), we have enclosed five (5) copies each of the September monthly report and July quarterly report.

If you have any questions, please call me at 522-5620.

Sincerely yours,

for Arthur Seli

Harry Olson
Hawaiian Electric Industries/
Spark Matsunaga Fellow in Geothermal
Energy Research

Enclosures: September monthly report
July quarterly report

JULY - SEPTEMBER 1990 QUARTERLY REPORT

Scientific Observation Hole (SOH) Program

Geothermal Resource Permit: GRP 89-1

Lilewa, Kapoho, and Halekamahina, Hawaii

TMK: 1-2-10:01; 1-4-01:02; and 1-4-02:32

Hawaii Natural Energy Institute

University of Hawaii

October 1990

SUMMARY

This document presents a quarterly report to the County of Hawaii Planning Department to support the scientific observation hole (SOHs) program in the Kilauea middle and lower east rift zone. The SOHs are for scientific observation purposes only. The holes will not be flow-tested or produced. The information to be gained from the SOHs will provide an assessment of subsurface geological conditions, groundwater level and composition, temperature, drilling conditions, an inventory of possible mineral and geothermal resources, and an eruptive history of the island to the depth drilled.

This report addresses: description of work under taken and planned; results of the environmental and noise monitoring activities; log of complaints; status of exploration activities; other information; and financial accounting.

I. INTRODUCTION

The County of Hawaii Planning Commission approved, on August 8, 1989, a geothermal resource permit application (GRP 89-1) to drill scientific observation holes (SOHs) in the Kilauea middle and lower east rift zone. This document presents a quarterly report, as required in condition 11:

"The petitioner shall submit five (5) copies of a status report to the Planning Department on a quarterly basis (by the first day of January, April, July, and October of each year), or, within 30 days of the completion of any SOH. The status report shall include, but not limited to:

- a. A detailed description of the work undertaken during the current reporting period including drilling activity report;
- b. A description of the work being proposed over the next reporting period;
- c. The results of the environmental/noise monitoring activities;
- d. A log of the complaints received and the responses thereto;
- e. The current status of exploration activities in the context of long-range program goals; and
- f. Any other information that the Planning Department may require which will address environmental and regulatory concerns involving the requirements of the Geothermal Resources Permit.
- g. This condition shall remain in effect until all of the conditions of approval have been complied with, then after which these reports shall be every six (6) months for the duration of the project.

- h. These reports shall include a financial accounting of the resources expended by the project."

II. BACKGROUND

The SOHs are for scientific observation purposes only. The holes will not be flow-tested or produced. A designated four holes are planned on the Big Island of Hawaii. Three of the Big Island holes (SOHs 1, 2, and 4) are on agriculture land and have been permitted by the County of Hawaii Planning Commission. The fourth hole, designated SOH 3, is on conservation land. Geothermal development activities under Conservation District Use Permit (HA 12/20/85 - 1830) issued to the Estate of James Campbell have been approved.

III. SOH 4 SITE

Description of Current Work

Tonto Drilling Services completed drilling work at SOH 4 on May 21, 1990 -- no drilling activity for this period. Post temperature profiles were conducted. County of Hawaii landfill officials found the mud pit material unsuitable (too wet) for their operations; therefore, Department of Health officials have given approval to bury the material on-site.

Description of Proposed Work

Various logs (i.e. temperature, pressure) and water sampling will be conducted in the hole on a periodic basis. The wellpad will be fenced. The mud and cuttings in the sump pit will be buried on-site and the site will be replanted with ohia seedlings.

Results of the Environmental/Noise Monitoring Activities

Drilling completed -- no activity for these monitoring activities.

Complaint Log and Response

Drilling completed -- no activity for this activity.

IV. SOH 1 SITE

Description of Current Work

Tonto drilling services commenced drilling activities at 3:00 pm on Thursday, May 31, 1990. Core drilling continued to a depth of 3346 feet as of September 30, 1990. Core drilling penetration rate of SOH 1 has been extremely slow due to frequent highly fractured and unconsolidated zones. Drill rods have been stuck throughout much of this reporting period on a number of occasions. See Appendix A for drilling reports of SOH 1.

Description of Proposed Work

Tonto Drilling Services will continue core drilling to a depth of about 6,000 feet. Then various logs (i.e. temperature, pressure, electrical, geophysical, etc.) will be conducted in the hole before the installation of the tubing. A high pressure wellhead valve will be welded to the casing, the wellpad fenced and secured. The mud and cuttings in the sump pit will be disposed in a similar manner recommended by the Department of Health for SOH 4.

Results of the Environmental/Noise Monitoring Activities

Passive hydrogen sulfide (H₂S) monitors were installed around the SOH 1

drill site. No H₂S emissions were detected during this reporting period.

The monitoring station located at SOH 1 is setup to measure air quality. These instruments provided a continuous record of atmospheric H₂S concentrations when interfaced with a data logger or chart recorder. The unit is located in a utility van on-site and power is provided by the drill rig system.

Continuous wind speed and direction measurements were made with a recording wind speed/direction sensor system relocated from SOH 4. A data logger and back-up pressure-sensitive recorder collects the wind speed and direction data. The unit is located in a utility van on-site and power is provided by the drill rig system. The height of the sensor location was increased to 16 feet.

A noise monitoring station is located at the SOH 1 site during drilling. A second noise station is located at the Laughlin residence, about a quarter mile west of SOH 1 drill site.

A third noise monitoring station is installed at the Pommerenk's residence, about a mile east of the SOH 1 site. Due to the lack of AC power on-site, this monitoring system is powered by batteries. Modifications were made on the monitoring system to reduce current load.

Minor technical problems primarily with the chart recorders and microphone have occurred. Power failure has been the source of most data

loss. The noise station located at the Pommerenk's residence was inundated by heavy rainfall. The unit was removed for complete servicing. A weather/security box will be built to protect this unit. The tape recorder, purchased for the Pommerenk's use, was completely filled with rain water and appears unrepairable.

Complaint Log and Response

Some noise complaints were received during this reporting period. See Appendix B for complaint notice and response. The noise consultant analysis reports for these complaints are in Appendix C. Analysis shows that SOH 1 drilling operations were within conditions set forth by Geothermal Resource Permit (GRP 89-1).

V. SOH 3 SITE

Description of Current Work

No drilling activity has been initiated. SOH 3 is scheduled to be located at the True/Mid-Pacific alternate drill site 2 (approximately 3,000 feet north-north-west of the present drill site). All necessary reports have been submitted to DLNR for review and approval.

Description of Proposed Work

Grading and grubbing work for access road and drill site will be done, prior to any drilling. Tentative plans call for the possibility of directional drilling from this pad in the northerly direction after the surface casing has been set.

Results of the Environmental/Noise Monitoring Activities

Ambient noise measured at SOH 4 will be used for SOH 3 site.

Complaint Log and Response

No drilling activity has been initiated. No complaints were received during this reporting period.

VI. SOH 2 SITE

Description of Current Work

No drilling activity has been initiated. Ambient noise monitoring is being prepared for SOH 2 site. Findings of the flora/fauna field surveys were submitted to County of Hawaii Planning Department. A request has been submitted to DLNR to extend the existing permit for the inspection, modification, and if practical installation of a pump into an existing well for supply water during drilling operations. A g Grading and grubbing permit application has been submitted to the County of Hawaii for approval.

Description of Proposed Work

Grading and grubbing work for utility corridor and drill site will be done, prior to any drilling. The airstrip well will be inspected to determine if it is feasible to pump water for drilling operations. Ambient noise surveys will be conducted prior to any drilling activity.

Results of the Environmental/Noise Monitoring Activities

No drilling activity has been initiated. Ambient noise surveys will be

recorded at appropriate sites.

Complaint Log and Response

No drilling activity has been initiated. No complaints were received during this reporting period.

VII. STATUS OF CURRENT EXPLORATION ACTIVITIES

No activities being pursued at this time, other than drilling at SOH 1, and permit activities at SOH 3 and SOH 2.

VIII. OTHER INFORMATION

No concerns need to be addressed at this time.

IX. FINANCIAL REPORT

See Appendix D for budget status.

APPENDIX A

DAILY DRILLING REPORTS -- SOH 1

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # <u>SOH-1</u>	Date <u>07-01-90</u>
Period Start <u>0700 6-30-90</u>	Spud Date <u>06-01-90</u>
Period End <u>0700 7-01-90</u>	Day # <u>31</u>
Depth Start <u>1802 ft.</u>	Contractor/Rig <u>Tonto/U-5000</u>
Depth End <u>1911 ft.</u>	Day Shift- _____
Footage <u>109 ft.</u>	Driller <u>Gillespie</u>
Mud Wt <u>8.5 #/gal</u>	Helper <u>Rose</u>
Mud Vis <u>42 sec.</u>	Helper <u>J.K.</u>
Mud pH <u>9.0</u>	Night Shift- _____
Mud Temp(F): IN <u>77</u> OUT <u>N/A</u>	Driller <u>Cunningham</u>
LC. @ _____	Helper <u>Riley</u>
Bits: _____	Helper <u>K.K.</u>
_____	Foreman <u>Fierback</u>
_____	Drilling Mgr <u>Deymonaz</u>

Additional Information: CORE WITH 101mm FROM 1802-1911 FT.
WITHOUT RETURNS. FLUID LEVEL IN HOLE REMAINING AT 620 FEET
WHILE RETRIEVING CORE BARREL. BOTTOM HOLE TEMPERATURES WHILE
RETRIEVING CORE BARREL LESS THAN THE 100 (F) DEGREE MINIMUM
READING ON THE MRT'S AT 1851 AND 1901 FEET.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12.25"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1911</u>	<u>N/A</u>	<u>N/A</u>
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 7-01-90
 Period End 0700 7-02-90
 Depth Start 1911 ft.
 Depth End 1996 ft.
 Footage 85 ft.
 Mud Wt 8.4 #/gal
 Mud Vis 42 sec.
 Mud pH 9.0
 Mud Temp(F):IN 78 OUT N/A
 LC. @ _____

Bits: _____

Date 07-02-90
 Spud Date 06-01-90
 Day # 32
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Gillespie
 Helper Rose
 Helper K.L.
 Night Shift-
 Driller Cunningham
 Helper Riley
 Helper K.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: CORE WITH 101mm FROM 1911-1996 FEET
WITHOUT RETURNS. FLUID LEVEL IN HOLE REMAINING AT 620 FEET
WHILE RETRIEVING CORE BARREL. BOTTOM HOLE TEMPERATURES WHILE
RETRIEVING CORE BARREL LESS THAN THE 100 (F) DEGREE MINIMUM
READING ON THE MRT'S AT 1,933 FEET. HOLE SURVEYED WHILE TRIP-
PING OUT, RESULTS AS FOLLOWS:

Depth (feet)	Angle (degree)	Azimuth
<u>1130</u>	<u>0.50</u>	<u>S</u>
<u>1250</u>	<u>0.50</u>	<u>S</u>
<u>1370</u>	<u>0.75</u>	<u>S</u>
<u>1490</u>	<u>1.0</u>	<u>S-5-E</u>
<u>1610</u>	<u>1.0</u>	<u>S-5-E</u>
<u>1730</u>	<u>1.0</u>	<u>S-10-E</u>
<u>1850</u>	<u>1.0</u>	<u>S-10-E</u>
<u>1990</u>	<u>0.75</u>	<u>S-10-W</u>

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12.25"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>	<u>N/A</u>	<u>N/A</u>
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE DAILY DRILLING REPORT

Hole #	<u>SOH-1</u>	Date	<u>07-03-90</u>
Period Start	<u>0700 7-02-90</u>	Spud Date	<u>06-01-90</u>
Period End	<u>0700 7-03-90</u>	Day #	<u>33</u>
Depth Start	<u>202 ft.</u>	Contractor/Rig	<u>Tonto/U-5000</u>
Depth End	<u>271 ft.</u>	Day Shift-	
Footage	<u>69 ft. (OPENED)</u>	Driller	<u>Gillespie</u>
Mud Wt	<u>9.0 #/gal</u>	Helper	<u>Rose</u>
Mud Vis	<u>42 sec.</u>	Helper	<u>K.L.</u>
Mud pH	<u>8.4</u>	Night Shift-	
Mud Temp(F):IN	<u>78</u>	Driller	<u>Cunningham</u>
OUT	<u>N/A</u>	Helper	<u>Riley</u>
LC. @		Helper	<u>K.K.</u>
Bits:		Foreman	<u>Fierback</u>
		Drilling Mgr	<u>Wicklund</u>

Additional Information: PULL 101mm CASING-REMOVE ROTATING HEAD AND MAKE UP BOTTOM HOLE ASSEMBLY (BHA) AS FOLLOWS:

<u>1-8 1/2" BIT STABALIZER & CROSSOVERS 5'5"</u>
<u>7-6" DRILL COLLARS 140'11"</u>
<u>1-8 1/2" STABILIZERS & CROSSOVERS 7'1"</u>
<u>TOTAL LENGTH OF BHA IS 153'5". OPEN 8 1/2" HOLE TO 271 FEET.</u>

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12.25"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>	<u>N/A</u>	<u>N/A</u>
	<u>(CORED HOLE)</u>		
<u>8.50"</u>	<u>202 to 271</u>	<u>N/A</u>	<u>N/A</u>
	<u>(OPENING HOLE)</u>		
	<u>to</u>		
	<u>to</u>		

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 7-03-90
 Period End 0700 7-04-90
 Depth Start 271 ft.
 Depth End 432 ft.
 Footage 161 ft. (OPENED)
 Mud Wt 8.0 #/gal
 Mud Vis 42 sec.
 Mud pH 7.5
 Mud Temp (F): IN 76 OUT N/A
 LC. @ _____

 Bits: _____

Date 07-04-90
 Spud Date 06-01-90
 Day # 34
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Gillespie
 Helper Rose
 Helper K.L.
 Night Shift-
 Driller LaOrange
 Helper Hanson
 Helper K.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: OPENING 4" HOLE TO 8 1/2" FROM 271-432
FEET.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12.25"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>	<u>N/A</u>	<u>N/A</u>
	<u>(CORED HOLE)</u>		
<u>8.50"</u>	<u>202 to 432</u>	<u>N/A</u>	<u>N/A</u>
	<u>(OPENING HOLE)</u>		
	<u>to</u>		
	<u>to</u>		

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 7-04-90
 Period End 0700 7-05-90
 Depth Start 432 ft.
 Depth End 549 ft.
 Footage 117 ft. (OPENED)
 Mud Wt 8.5 #/gal
 Mud Vis 42 sec.
 Mud pH 8.0
 Mud Temp (F): IN 76 OUT N/A
 LC. @ _____
 Bits: _____

Date 07-05-90
 Spud Date 06-01-90
 Day # 35
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Gillespie
 Helper Rose
 Helper K.L.
 Night Shift- _____
 Driller LaOrange
 Helper Hanson
 Helper K.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: OPENING 4" HOLE TO 8 1/2"-PLANS ARE TO
PULL DRILL PIPE ON 07-05-90 AM. MAGNA-FLUX COLLARS, STABILIZERS
& CROSSOVERS. REDIMIX ORDERED FOR NOON ARRIVAL & HOLE WILL BE
BACKFILLED WITH CEMENT.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
12.25"	0 to 202	9-5/8" (0-202)	K-55/40#
4.0"	202 to 1996	N/A	N/A
	(CORED HOLE)		
8.50"	202 to 549	N/A	N/A
	(OPENING HOLE)		
	to		
	to		

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 7-05-90
 Period End 0700 7-06-90
 Depth Start 1996 ft.
 Depth End 1996 ft.
 Footage 0 ft.
 Mud Wt 8.6 #/gal
 Mud Vis 42 sec.
 Mud pH 9.0
 Mud Temp (F): IN 77 OUT N/A
 LC. @ _____

 Bits: _____

Date 07-06-90
 Spud Date 06-01-90
 Day # 36
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Gillespie
 Helper Rose
 Helper K.L.
 Night Shift- _____
 Driller LaOrange
 Helper Hanson
 Helper K.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: OPEN 4" HOLE TO 8 1/2" FROM 549-555 FT.
TRIP BIT. INSPECT COLLARS-ONE STABILIZER HAS CRACKED THREAD.
CEMENTED THROUGH DRILL PIPE WITH REDIMIX. CEMENT BRIDGED IN
PIPE. BACKFILLED HOLE TO 170 FEET WITH CEMENT. WAITING ON
CEMENT (WOC) 12 HOURS. DRILL CEMENT FROM 170 TO 253 FEET.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12.25"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>	<u>N/A</u>	<u>N/A</u>
<u>8.50"</u>	<u>202 to 555</u>	<u>N/A</u>	<u>N/A</u>
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 7-06-90
 Period End 0700 7-07-90
 Depth Start 1996 ft.
 Depth End 1996 ft.
 Footage 0 ft.
 Mud Wt 10.2 #/gal
 Mud Vis 62 sec.
 Mud pH 11.0
 Mud Temp (F): IN 76 OUT N/A
 LC. @ _____

 Bits: _____

Date 07-07-90
 Spud Date 06-01-90
 Day # 37
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Gillespie
 Helper Rose
 Helper K.L.
 Night Shift-
 Driller LaOrange
 Helper Hanson
 Helper K.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: DRILLING OUT CEMENT FROM 253-430 FEET
(177). LOST CIRCULATION AT 344 FT. CEMENT VERY HARD DUE TO
MIXTURE OF 3/8" GRAVEL (808 LBS. PER CUBIC YARD) & SAND (2185
LBS PER CUBIC YARD).

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12.25"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>	<u>N/A</u>	<u>N/A</u>
<u>8.50"</u>	<u>202 to 430</u>	<u>N/A</u>	<u>N/A</u>
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 7-07-90
 Period End 0700 7-08-90
 Depth Start 1996 ft.
 Depth End 1996 ft.
 Footage 0 ft.
 Mud Wt 9.4 #/gal
 Mud Vis 54 sec.
 Mud pH 9.8
 Mud Temp(F):IN 76 OUT N/A
 LC. @ _____

 Bits: _____

Date 07-08-90
 Spud Date 06-01-90
 Day # 38
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Gillespie
 Helper Rose
 Helper K.L.
 Night Shift-
 Driller LaOrange
 Helper Hanson
 Helper K.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: DRILLING OUT CEMENT FROM 430-555 FEET
(125 FT). OPEN 4" HOLE TO 8 1/2" FROM 555 TO 573 FEET. NO
RETURN OF FLUIDS SINCE LOSING CIRCULATION AT 344 FEET.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12.25"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>	<u>N/A</u>	<u>N/A</u>
<u>8.50"</u>	<u>202 to 573</u>	<u>N/A</u>	<u>N/A</u>
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 7-08-90
 Period End 0700 7-09-90
 Depth Start 1996 ft.
 Depth End 1996 ft.
 Footage 0 ft.
 Mud Wt 9.0 #/gal
 Mud Vis 52 sec.
 Mud pH 9.0
 Mud Temp (F): IN 76 OUT N/A
 LC. @ _____

 Bits: _____

Date 07-09-90
 Spud Date 06-01-90
 Day # 39
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Gillespie
 Helper Rose
 Helper K.L.
 Night Shift-
 Driller LaOrange
 Helper Hanson
 Helper K.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: OPEN 4" HOLE FROM 573-590 FEET (17 FT).
DRIVE TRAIN WENT OUT ON U-5000 DRILL AT 0900 HOURS. WAITING ON
PARTS TO ARRIVE FROM DALLAS, TEXAS.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12.25"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>	<u>N/A</u>	<u>N/A</u>
<u>8.50"</u>	<u>202 to 590</u>	<u>N/A</u>	<u>N/A</u>
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 7-09-90
 Period End 0700 7-10-90
 Depth Start 1996 ft.
 Depth End 1996 ft.
 Footage 0 ft.
 Mud Wt _____
 Mud Vis _____
 Mud pH _____
 Mud Temp (F) : IN ____ OUT ____
 LC. @ _____
 Bits: _____

Date 07-10-90
 Spud Date 06-01-90
 Day # 40
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Gillespie
 Helper Rose
 Helper _____
 Night Shift- _____
 Driller LaOrange
 Helper Hanson
 Helper _____
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: DRILLING OPERATIONS SUSPENDED WHILE
WAITING ON PARTS TO ARRIVE FROM THE MAINLAND.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12.25"</u>	<u>0</u> to <u>202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202</u> to <u>1996</u>	<u>N/A</u>	<u>N/A</u>
<u>8.50"</u>	<u>202</u> to <u>590</u>	<u>N/A</u>	<u>N/A</u>
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 7-10-90
 Period End 0700 7-11-90
 Depth Start 590 ft.
 Depth End 621 ft.
 Footage 31 ft.
 Mud Wt 8.5 #/gal
 Mud Vis 42 sec
 Mud pH 9.0
 Mud Temp (F): IN 76 OUT N/A
 LC. @ _____

Bits: _____

Date 07-11-90
 Spud Date 06-01-90
 Day # 41
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Gillespie
 Helper Rose
 Helper _____
 Night Shift-
 Driller LaOrange
 Helper Hanson
 Helper K.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: 14 HOURS DOWN FOR REPAIRS. STARTED
OPERATIONS AT 2100 HOURS. OPEN 4" HOLE FROM 590-621 FEET.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12.25"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>	<u>N/A</u>	<u>N/A</u>
<u>8.50"</u>	<u>202 to 621</u>	<u>N/A</u>	<u>N/A</u>
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 7-11-90
 Period End 0700 7-12-90
 Depth Start 621 ft.
 Depth End 629 ft.
 Footage 8 ft.
 Mud Wt 9.0 #/gal
 Mud Vis 50 sec
 Mud pH 9.0
 Mud Temp (F): IN 77 OUT N/A
 LC. @ _____

Bits: _____

Date 07-12-90
 Spud Date 06-01-90
 Day # 42
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Gillespie
 Helper Rose
 Helper K.L.
 Night Shift-
 Driller LaOrange
 Helper Hanson
 Helper K.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: OPENING 4" HOLE TO 8 1/2" DOWN TO 621
FEET. CEMENTING HOLE FROM TOTAL DEPTH (TD) BACK TO 280 FT.
WAITING ON CEMENT (WOC).

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12.25"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>	<u>N/A</u>	<u>N/A</u>
<u>8.50"</u>	<u>202 to 629</u>	<u>N/A</u>	<u>N/A</u>
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 7-12-90
 Period End 0700 7-13-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt 8.2 #/gal
 Mud Vis 38 sec
 Mud pH 9.0
 Mud Temp (F): IN 76 OUT N/A
 LC. @ _____
 Bits: _____

Date 07-13-90
 Spud Date 06-01-90
 Day # 43
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Gillespie
 Helper Rose
 Helper K.L.
 Night Shift- _____
 Driller LaOrange
 Helper Hanson
 Helper K.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: DRILL CEMENT FROM 472 FT. TO 622 FT.
LOST CIRCULATION @ 472 FT. REGAINED CIRCULATION AT 550 FT.
AND LOST IT AGAIN @ 583 FEET.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12.25"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>	<u>N/A</u>	<u>N/A</u>
<u>8.50"</u>	<u>202 to 629</u>	<u>N/A</u>	<u>N/A</u>
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 7-13-90
 Period End 0700 7-14-90
 Depth Start 629
 Depth End 770
 Footage 141 ft.
 Mud Wt 8.2 #/gal
 Mud Vis 42 sec
 Mud pH 9.0
 Mud Temp(F):IN 75 OUT N/A
 LC. @ _____

Bits: _____

Date 07-14-90
 Spud Date 06-01-90
 Day # 44
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Gillespie
 Helper Rose
 Helper K.L.
 Night Shift-
 Driller LaOrange
 Helper Hanson
 Helper K.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: DRILL CEMENT FORM 622-629 FEET (7 FT).
OPEN 4" HOLE TO 8 1/2" FROM 629-770.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12.25"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>	<u>N/A</u>	<u>N/A</u>
<u>8.50"</u>	<u>202 to 770</u>	<u>N/A</u>	<u>N/A</u>
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 7-14-90
 Period End 0700 7-15-90
 Depth Start 770
 Depth End 796
 Footage 26 ft.
 Mud Wt 8.2 #/gal
 Mud Vis 40 sec
 Mud pH 9.0
 Mud Temp(F): IN 77 OUT N/A
 LC. @ _____

Bits: _____

Date 07-15-90
 Spud Date 06-01-90
 Day # 45
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Gillespie
 Helper Rose
 Helper K.L.
 Night Shift-
 Driller LaOrange
 Helper Hanson
 Helper K.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: OPEN 4" HOLE TO 8 1/2" FROM 770-796 FT.
CEMENT HOLE AND WAIT FOR CEMENT TO SET. WASH & DRILL CEMENT
FROM 353-591 FT. WITH FULL FLUID RETURNS.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12.25"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>	<u>N/A</u>	<u>N/A</u>
<u>8.50"</u>	<u>202 to 796</u>	<u>N/A</u>	<u>N/A</u>
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 7-15-90
 Period End 0700 7-16-90
 Depth Start 796
 Depth End 870
 Footage 74 ft.
 Mud Wt 8.3 #/gal
 Mud Vis 40 sec
 Mud pH 9.0
 Mud Temp (F): IN 75 OUT N/A
 LC. @ _____

Bits: _____

Date 07-16-90
 Spud Date 06-01-90
 Day # 46
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Gillespie
 Helper Rose
 Helper K.L.
 Night Shift-
 Driller LaOrange
 Helper Hanson
 Helper K.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: DRILL CEMENT FROM 591-796 FT. (205 FT).
OPEN 4" HOLE TO 8 1/2" FROM 796-870 FT. (74 FT). RETURN
CIRCULATION APPROXIMATELY 90% OF THAT BEING INJECTED.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12.25"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>	<u>N/A</u>	<u>N/A</u>
<u>8.50"</u>	<u>202 to 870</u>	<u>N/A</u>	<u>N/A</u>
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 7-16-90
 Period End 0700 7-17-90
 Depth Start 870
 Depth End 1023
 Footage 153 ft.
 Mud Wt 8.2 #/gal
 Mud Vis 45 sec
 Mud pH 10.0
 Mud Temp(F):IN 76 OUT N/A
 LC. @ 940 ft.
 Bits: _____

Date 07-17-90
 Spud Date 06-01-90
 Day # 47
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Cunningham
 Helper J.K.
 Helper K.L.
 Night Shift-
 Driller LaOrange
 Helper Hanson
 Helper K.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: OPEN 4" HOLE TO 8 1/2" FROM 870-1023
FEET (153 FT).

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12.25"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>	<u>N/A</u>	<u>N/A</u>
<u>8.50"</u>	<u>202 to 1023</u>	<u>N/A</u>	<u>N/A</u>
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # <u>SOH-1</u>	Date <u>07-18-90</u>
Period Start <u>0700 7-17-90</u>	Spud Date <u>06-01-90</u>
Period End <u>0700 7-18-90</u>	Day # <u>48</u>
Depth Start <u>1023</u>	Contractor/Rig <u>Tonto/U-5000</u>
Depth End <u>1180</u>	Day Shift- _____
Footage <u>157 ft.</u>	Driller <u>Cunningham</u>
Mud Wt <u>8.8 #/gal</u>	Helper <u>J.K.</u>
Mud Vis <u>48 sec</u>	Helper <u>K.L.</u>
Mud pH <u>9.0</u>	Night Shift- _____
Mud Temp(F): IN <u>77</u> OUT <u>N/A</u>	Driller <u>LaOrange</u>
LC. @ _____	Helper <u>Hanson</u>
Bits: _____	Helper <u>K.K.</u>
_____	Foreman <u>Fierback</u>
_____	Drilling Mgr <u>Wicklund</u>

Additional Information: OPEN 4" HOLE TO 8 1/2" FROM 1023-1180 FEET (157 FT). OBTAINING ABOUT 50% FLUID RETURN. PLANS ARE TO CEMENT THE HOLE ON THE 18TH AFTER DRILLING THROUGH ZONES OF FRACTURED BASALTS.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12.25"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>	<u>N/A</u>	<u>N/A</u>
<u>8.50"</u>	<u>202 to 1180</u>	<u>N/A</u>	<u>N/A</u>
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 7-18-90
 Period End 0700 7-19-90
 Depth Start 1180
 Depth End 1200
 Footage 20 ft.
 Mud Wt 8.2 #/gal
 Mud Vis 48 sec
 Mud pH 9.0
 Mud Temp (F): IN 77 OUT N/A
 LC. @ _____

Bits: _____

Date 07-19-90
 Spud Date 06-01-90
 Day # 49
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Cunningham
 Helper J.K.
 Helper K.L.
 Night Shift-
 Driller LaOrange
 Helper Hanson
 Helper K.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: OPEN 4" HOLE TO 8 1/2" FROM 1180-1200
FEET (20 FT). PULLED DRILL PIPE AND TOOK OFF BOTTOM HOLE
ASSEMBLY. LOWER OPEN DRILL PIPE AND CEMENTED HOLE BACK FROM
1200 FT. TO 800 FT. WAITING ON CEMENT 8 HOURS AND THEN WASHED
AND DRILLED CEMENT DOWN TO 1032 FT.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12.25"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>	<u>N/A</u>	<u>N/A</u>
<u>8.50"</u>	<u>202 to 1200</u>	<u>N/A</u>	<u>N/A</u>
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 7-19-90
 Period End 0700 7-20-90
 Depth Start 1200
 Depth End 1298
 Footage 98 ft.
 Mud Wt 8.2 #/gal
 Mud Vis 40 sec
 Mud pH 10.0
 Mud Temp(F):IN 77 OUT N/A
 LC. @ _____

 Bits: _____

Date 07-20-90
 Spud Date 06-01-90
 Day # 50
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Cunningham
 Helper J.K.
 Helper K.L.
 Night Shift-
 Driller LaOrange
 Helper Hanson
 Helper K.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: DRILL CEMENT FROM 1032 TO 1229 FEET.
OPEN 4" HOLE TO 8 1/2" FROM 1200 TO 1298 FEET (98 FT).

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12.25"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>	<u>N/A</u>	<u>N/A</u>
<u>8.50"</u>	<u>202 to 1298</u>	<u>N/A</u>	<u>N/A</u>
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 7-20-90
 Period End 0700 7-21-90
 Depth Start 1298
 Depth End 1412
 Footage 114 ft.
 Mud Wt 8.3 #/gal
 Mud Vis 40 sec
 Mud pH 10.0
 Mud Temp(F): IN 75 OUT N/A
 LC. @ _____

 Bits: _____

Date 07-21-90
 Spud Date 06-01-90
 Day # 51
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Cunningham
 Helper J.K.
 Helper K.L.
 Night Shift-
 Driller LaOrange
 Helper Hanson
 Helper K.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: OPEN 4" HOLE TO 8.5" FROM 1298 TO 1412
FEET (114 FT).

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12.25"</u>	<u>0</u> to <u>202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202</u> to <u>1996</u>	<u>N/A</u>	<u>N/A</u>
<u>8.50"</u>	<u>202</u> to <u>1412</u>	<u>N/A</u>	<u>N/A</u>
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 7-21-90
 Period End 0700 7-22-90
 Depth Start 1412
 Depth End 1574
 Footage 162 ft.
 Mud Wt 8.3 #/gal
 Mud Vis 40 sec
 Mud pH 11.0
 Mud Temp (F): IN 75 OUT N/A
 LC. @ _____

 Bits: _____

Date 07-22-90
 Spud Date 06-01-90
 Day # 52
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Cunningham
 Helper J.K.
 Helper K.L.
 Night Shift-
 Driller LaOrange
 Helper Hanson
 Helper K.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: OPEN 4" HOLE TO 8.5" FROM 1412 TO 1574
FEET (162 FT).

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12.25"</u>	<u>0</u> to <u>202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202</u> to <u>1996</u>	<u>N/A</u>	<u>N/A</u>
<u>8.50"</u>	<u>202</u> to <u>1574</u>	<u>N/A</u>	<u>N/A</u>
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 7-22-90
 Period End 0700 7-23-90
 Depth Start 1574
 Depth End 1731
 Footage 157 ft.
 Mud Wt 8.5 #/gal
 Mud Vis 45 sec
 Mud pH 10.0
 Mud Temp (F): IN 76 OUT N/A
 LC. @ _____

Bits: _____

Date 07-23-90
 Spud Date 06-01-90
 Day # 53
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Cunningham
 Helper J.K.
 Helper K.L.
 Night Shift-
 Driller LaOrange
 Helper Hanson
 Helper K.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: OPEN 4" HOLE TO 8.5" FROM 1574 TO 1731
FEET (157 FT).

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12.25"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>	<u>N/A</u>	<u>N/A</u>
<u>8.50"</u>	<u>202 to 1731</u>	<u>N/A</u>	<u>N/A</u>
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # <u>SOH-1</u>	Date <u>07-24-90</u>
Period Start <u>0700 7-23-90</u>	Spud Date <u>06-01-90</u>
Period End <u>0700 7-24-90</u>	Day # <u>54</u>
Depth Start <u>1731</u>	Contractor/Rig <u>Tonto/U-5000</u>
Depth End <u>1820</u>	Day Shift- _____
Footage <u>89 ft.</u>	Driller <u>Cunningham</u>
Mud Wt <u>8.5 #/gal</u>	Helper <u>J.K.</u>
Mud Vis <u>45 sec</u>	Helper <u>K.L.</u>
Mud pH <u>10.0</u>	Night Shift- _____
Mud Temp (F): IN <u>75</u> OUT <u>N/A</u>	Driller <u>LaOrange</u>
LC. @ _____	Helper <u>Hanson</u>
Bits: _____	Helper <u>K.K.</u>
_____	Foreman <u>Fierback</u>
_____	Drilling Mgr <u>Wicklund</u>

Additional Information: OPEN 4" HOLE TO 8.5" FROM 1731 TO 1820 FEET (89 FT).

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12.25"</u>	<u>0</u> to <u>202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202</u> to <u>1996</u>	<u>N/A</u>	<u>N/A</u>
<u>8.50"</u>	<u>202</u> to <u>1820</u>	<u>N/A</u>	<u>N/A</u>
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 7-24-90
 Period End 0700 7-25-90
 Depth Start 1820
 Depth End 1958
 Footage 138 ft.
 Mud Wt 8.3 #/gal
 Mud Vis 40 sec
 Mud pH 10.0
 Mud Temp(F):IN 76 OUT N/A
 LC. @ _____
 Bits: _____

Date 07-25-90
 Spud Date 06-01-90
 Day # 55
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Cunningham
 Helper J.K.
 Helper K.L.
 Night Shift-
 Driller LaOrange
 Helper Hanson
 Helper K.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: OPEN 4" HOLE TO 8.5" FROM 1820 TO 1958
FEET (138 FT).

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12.25"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>	<u>N/A</u>	<u>N/A</u>
<u>8.50"</u>	<u>202 to 1958</u>	<u>N/A</u>	<u>N/A</u>
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 7-25-90
 Period End 0700 7-26-90
 Depth Start 1958
 Depth End 1996
 Footage 38 ft.
 Mud Wt 8.4 #/gal
 Mud Vis 52 sec
 Mud pH 11.0
 Mud Temp(F): IN 75 OUT N/A
 LC. @ _____

 Bits: _____

Date 07-26-90
 Spud Date 06-01-90
 Day # 56
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Cunningham
 Helper J.K.
 Helper K.L.
 Night Shift-
 Driller LaOrange
 Helper Hanson
 Helper K.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: OPEN 4" HOLE TO 8.5" FROM 1958 TO 1996 FEET (38 FT). CONDITION HOLE. FILL HOLE WITH NEW MUD PRIOR TO CASING. BREAK OUT RODS-REMOVE BOP AND START RUNNING 7" CASING.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12.25"</u>	<u>0</u> to <u>202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202</u> to <u>1996</u>	<u>N/A</u>	<u>N/A</u>
<u>8.50"</u>	<u>202</u> to <u>1996</u>	<u>N/A</u>	<u>N/A</u>
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 7-26-90
 Period End 0700 7-27-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt _____
 Mud Vis _____
 Mud pH _____
 Mud Temp (F) : IN ____ OUT ____
 LC. @ _____
 Bits: _____

Date 07-27-90
 Spud Date 06-01-90
 Day # 57
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Cunningham
 Helper J.K.
 Helper K.L.
 Night Shift- _____
 Driller LaOrange
 Helper Hanson
 Helper K.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: WHILE RUNNING CASING (1800 FEET) THE
CABLE BROKE BEHIND THE SOCKET AND CASING DROPPED DOWN THE HOLE.
BUILDING FISHING TOOLS TO RETRIEVE ADAPTOR IN CASING & FISHING
FOR CASING.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12.25"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>	<u>N/A</u>	<u>N/A</u>
<u>8.50"</u>	<u>202 to 1996</u>	_____	_____
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 7-27-90
 Period End 0700 7-28-90
 Depth Start
 Depth End
 Footage
 Mud Wt
 Mud Vis
 Mud pH
 Mud Temp (F): IN OUT
 LC. @

 Bits:

Date 07-28-90
 Spud Date 06-01-90
 Day # 58
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Cunningham
 Helper K.L.
 Helper J.K.
 Night Shift-
 Driller LaOrange
 Helper Hansen
 Helper K.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: BUILD FISHING TOOLS TO FISH OUT ADAPTER
ON TOP OF 7" CASING. COULD NOT KEEP JOINTS FROM UNSCREWING.
USED HALLIBURTON LIQUID WELD TO HOLD JOINTS TOGETHER. BACKED
OFF PLUG HALFWAY AND JOINTS WITH LIQUID WELD BROKE LOOSE.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>	<u> </u>	<u> </u>
<u>8.5"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 7-28-90
 Period End 0700 7-29-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt _____
 Mud Vis _____
 Mud pH _____
 Mud Temp (F): IN ____ OUT ____
 LC. @ _____
 Bits: _____

Date 07-29-90
 Spud Date 06-01-90
 Day # 59
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Cunningham
 Helper J.K.
 Helper K.L.
 Night Shift- _____
 Driller LaOrange
 Helper Hanson
 Helper K.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: FISHING OUT ADAPTOR IN TOP OF CASING.
LOWER 5 5/8" ROCK BIT TO TOP OF FLOAT COLLAR TO MAKE SURE THAT
THE CASING IS O.K. CONNECT INTO CASING. PULLED 80,000 POUNDS.
CASING WOULD NOT MOVE. HOOKED UP PUMP AND CIRCULATED MUD BACK
TO SURFACE. SET UP FOR CEMENTING.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
12.25"	0 to 202	9-5/8" (0-202)	K-55/40#
4.0"	202 to 1996	N/A	N/A
8.50"	202 to 1996	7" (0-1996)	L-80/35#
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # <u>SOH-1</u>	Date <u>07-30-90</u>
Period Start <u>0700 7-29-90</u>	Spud Date <u>06-01-90</u>
Period End <u>0700 7-30-90</u>	Day # <u>60</u>
Depth Start _____	Contractor/Rig <u>Tonto/U-5000</u>
Depth End _____	Day Shift- _____
Footage _____	Driller <u>Cunningham</u>
Mud Wt _____	Helper <u>J.K.</u>
Mud Vis _____	Helper <u>K.L.</u>
Mud pH _____	Night Shift- _____
Mud Temp (F) : IN _____ OUT _____	Driller <u>LaOrange</u>
LC. @ _____	Helper <u>Hanson</u>
Bits: _____	Helper <u>K.K.</u>
_____	Foreman <u>Fierback</u>
_____	Drilling Mgr <u>Wicklund</u>

Additional Information: CEMENT CASING. CEMENT CAME WITHIN 200 FEET OF SURFACE AND HOLE BROKE LOOSE. WAITED 4 HOURS AND RE-CEMENTED (NO RETURNS). WAITED 4 HOURS AND FILLED HOLE WITH CEMENT. SETTING UP TO WELD WELL HEAD.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12.25"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>	<u>N/A</u>	<u>N/A</u>
<u>8.50"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # <u>SOH-1</u>	Date <u>07-31-90</u>
Period Start <u>0700 7-30-90</u>	Spud Date <u>06-01-90</u>
Period End <u>0700 7-31-90</u>	Day # <u>61</u>
Depth Start _____	Contractor/Rig <u>Tonto/U-5000</u>
Depth End _____	Day Shift- _____
Footage _____	Driller <u>Cunningham</u>
Mud Wt _____	Helper <u>J.K.</u>
Mud Vis _____	Helper <u>K.L.</u>
Mud pH _____	Night Shift- _____
Mud Temp(F): IN ____ OUT ____	Driller <u>LaOrange</u>
LC. @ _____	Helper <u>Hanson</u>
_____	Helper <u>K.K.</u>
Bits: _____	Foreman <u>Fierback</u>
_____	Drilling Mgr <u>Wicklund</u>

Additional Information: WELDING ON WELL HEAD. INSTALL B.O.P.
AND 6" DRILLING VALVE. TEST B.O.P. (O.K.). DRILL CEMENT FROM
1852-1978 FEET.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12.25"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>	<u>N/A</u>	<u>N/A</u>
<u>8.50"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
_____	_____ to _____	_____	_____
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 7-31-90
 Period End 0700 8-01-90
 Depth Start 1996
 Depth End 2014
 Footage 18 ft.
 Mud Wt 8.2 #/gal
 Mud Vis 40 sec
 Mud pH 9.0
 Mud Temp(F):IN 75 OUT N/A
 LC. @ _____

Bits: 1-101mm #1999-1 ruined
after drilling below
casing float shoe.

Date 08-01-90
 Spud Date 06-01-90
 Day # 62
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Cunningham
 Helper Hanson
 Helper J.K.
 Night Shift-
 Driller LaOrange
 Helper Rose
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: INSTALL ROTATING HEAD ON B.O.P. STACK.
101mm DRILL BIT RUINED AFTER DRILLING 16 FEET (POSSIBLE WHITE
METAL FROM FLOAT SHOE). DRILLED 5 5/8" HOLE FROM 1996-1998 FT
TO SEAT 5" CASING.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>8 1/2"</u>	<u>0 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 5/8"</u>	<u>1996 to 1998</u>	<u>5" (0-1998)*</u>	<u>_____</u>
<u>_____</u>	<u>_____ to _____</u>	<u>_____</u>	<u>_____</u>

*NOTE: 5" CASING ONLY USED AS A LATERAL SUPPORT FOR THE 101mm
DRILL PIPE.

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 8-01-90
 Period End 0700 8-02-90
 Depth Start 2014
 Depth End 2074
 Footage 60 ft.
 Mud Wt 8.1 #/gal
 Mud Vis 39 sec
 Mud pH 9.0
 Mud Temp(F): IN 75 OUT
 LC. @

Bits: 1-101mm #19999-2
1-101mm shell #68313
1-HQ core lifter case
1-HQ stabalizer
1-Sub 134mm to 5" pin

Date 08-02-90
 Spud Date 06-01-90
 Day # 63
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Cunningham
 Helper Hanson
 Helper J.K.
 Night Shift-
 Driller LaOrange
 Helper Rose
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: INSIDE GAUGE ON BIT RUINED (POSSIBLY FROM WHITE METAL IN 7" CASING SHOE). ROCK BADLY FRACTURED.

History .

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 5/8"</u>	<u>1996 to 1998</u>	<u>5" (0-1998) *</u>	<u>1035/14#</u>
	<u> to</u>		

*NOTE: 5" CASING ONLY USED AS A LATERAL SUPPORT FOR THE 101mm DRILL PIPE.

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 8-02-90
 Period End 0700 8-03-90
 Depth Start 2074
 Depth End 2137
 Footage 63 ft.
 Mud Wt 8.1 #/gal
 Mud Vis 41 sec
 Mud pH 10.0
 Mud Temp (F): IN 76 OUT
 LC. @
 Bits: 1-101mm #L-68517

Date 08-03-90
 Spud Date 06-01-90
 Day # 64
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Cunningham
 Helper Hanson
 Helper J.K.
 Night Shift-
 Driller LaOrange
 Helper Rose
 Helper K.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: THIRD BIT (101mm) RUINED. ROCK HARD
AND BROKEN (CAVE IN HOLE).

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 5/8"</u>	<u>1996 to 1998</u>	<u>5" (0-1998)*</u>	<u>1035/14#</u>
	<u>to</u>		

*NOTE: 5" CASING ONLY USED AS A LATERAL SUPPORT FOR THE 101mm
DRILL PIPE.

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 8-03-90
 Period End 0700 8-04-90
 Depth Start 2137
 Depth End 2201
 Footage 64 ft.
 Mud Wt 8.1 #/gal
 Mud Vis 39 sec
 Mud pH 9
 Mud Temp(F): IN 76 OUT
 LC. @
 Bits:

Date 08-04-90
 Spud Date 06-01-90
 Day # 65
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Cunningham
 Helper Hanson
 Helper J.K.
 Night Shift-
 Driller LaOrange
 Helper Rose
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: HOLE EITHER SQUEEZING, CAVING, OR BOTH.
HOLE GETTING TIGHT FROM 2176 TO 2201; PULLED BACK TO CASING.
HIT CAVE AT 2060 FEET, GOING BACK DOWN HOLE.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 5/8"</u>	<u>1996 to 1998</u>	<u>5" (0-1998)*</u>	<u>1035/14#</u>
<u> </u>	<u> to </u>	<u> </u>	<u> </u>

*NOTE: 5" CASING ONLY USED AS A LATERAL SUPPORT FOR THE 101mm
DRILL PIPE.

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 8-04-90
 Period End 0700 8-05-90
 Depth Start 2201
 Depth End 2266
 Footage 65 ft.
 Mud Wt 8.3 #/gal
 Mud Vis 37 sec
 Mud pH 11
 Mud Temp(F):IN 75 OUT N/A
 LC. @ 2230 Feet
 Bits: 1-101mm #L-69515

Date 08-05-90
 Spud Date 06-01-90
 Day # 66
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Cunningham
 Helper Hanson
 Helper J.K.
 Night Shift-
 Driller LaOrange
 Helper Rose
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: FRACTURED DIKE FORMATION SPALLING INTO
HOLE ON BIT CHANGES AND AT TIMES REQUIRES CHASING THESE PIECES
TO THE BOTTOM OF HOLE. WATER LOST WHILE DRILLING AT 2230 FT.
WATER LEVEL STANDING AT 660' IN HOLE.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 5/8"</u>	<u>1996 to 1998</u>	<u>5" (0-1998)*</u>	<u>1035/14#</u>
	<u>to</u>		

*NOTE: 5" CASING ONLY USED AS A LATERAL SUPPORT FOR THE 101mm
DRILL PIPE.

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 8-05-90
 Period End 0700 8-06-90
 Depth Start 2266
 Depth End 2368
 Footage 102 ft.
 Mud Wt 8.1 #/gal
 Mud Vis 37 sec
 Mud pH 10
 Mud Temp (F): IN 76 OUT N/A
 LC. @ _____
 Bits: 1-101mm #L-68516

Date 08-06-90
 Spud Date 06-01-90
 Day # 67
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Cunningham
 Helper Hanson
 Helper J.K.
 Night Shift-
 Driller LaOrange
 Helper Rose
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: WATER LEVEL FLUCTUATES BETWEEN 590-660 FEET. BOTTOM HOLE TEMPERATURES LESS THAN 100° WHEN MEASURED DURING THIS INTERVAL.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 5/8"</u>	<u>1996 to 1998</u>	<u>5" (0-1998)*</u>	<u>1035/14#</u>
	<u>to</u>		

*NOTE: 5" CASING ONLY USED AS A LATERAL SUPPORT FOR THE 101mm DRILL PIPE.

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 8-06-90
 Period End 0700 8-07-90
 Depth Start 2368
 Depth End 2481
 Footage 113 ft.
 Mud Wt 8.2 #/gal
 Mud Vis 39 sec
 Mud pH 9
 Mud Temp (F): IN 76 OUT N/A
 LC. @ _____
 Bits: 1-101mm OR19999-6

Date 08-07-90
 Spud Date 06-01-90
 Day # 68
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Cunningham
 Helper Hanson
 Helper J.K.
 Night Shift-
 Driller LaOrange
 Helper Rose
 Helper K.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: TEMPERATURE AT 2450 FT LESS THAN 100°.
HIT 15 FEET OF SAND AT 2422 FEET. FLUID LEVEL IN HOLE AT 640
FEET.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0</u> to <u>202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>8 1/2"</u>	<u>202</u> to <u>1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 5/8"</u>	<u>1996</u> to <u>1998</u>	<u>5"* (0-1998)</u>	<u>1035/14#</u>
_____	_____ to _____	_____	_____

*NOTE: 5" CASING USED AS A SUPPORT FOR THE 101mm DRILL PIPE.

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 8-07-90
 Period End 0700 8-08-90
 Depth Start 2481
 Depth End 2505
 Footage 24 ft.
 Mud Wt 8.5 #/gal
 Mud Vis 40 sec
 Mud pH 11
 Mud Temp (F): IN 75 OUT N/A
 LC. @ _____
 Bits: 1-101mm OR19999-6

Date 08-08-90
 Spud Date 06-01-90
 Day # 69
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Hanson
 Helper J.K.
 Helper _____
 Night Shift- _____
 Driller LaOrange
 Helper Rose
 Helper K.L.
 Foreman Cunningham
 Drilling Mgr Wicklund

Additional Information: DRILLED UNCONSOLIDATED SAND FROM 2419.5 TO 2448 FEET (28.5 FT). DRILLED AHEAD TO 2481 FEET AND DRILL PIPE TORQUING UP. PULLED BACK ABOVE SAND ZONE AND CIRCULATED. LOWERING BACK TO BOTTOM AND HIT SAND IN HOLE AT 2469 FT. PULL DRILL PIPE TO CEMENT PROBLEM ZONE AND CEMENTED.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 5/8"</u>	<u>1996 to 1998</u>	<u>5"* (0-1998)</u>	<u>1035/14#</u>
_____	_____ to _____	_____	_____

*NOTE: 5" CASING USED AS A SUPPORT FOR THE 101mm DRILL PIPE.

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # <u>SOH-1</u>	Date <u>08-09-90</u>
Period Start <u>0700 8-08-90</u>	Spud Date <u>06-01-90</u>
Period End <u>0700 8-09-90</u>	Day # <u>70</u>
Depth Start <u>2505</u>	Contractor/Rig <u>Tonto/U-5000</u>
Depth End <u>2505</u>	Day Shift- _____
Footage _____	Driller <u>Hanson</u>
Mud Wt _____	Helper <u>J.K.</u>
Mud Vis _____	Helper _____
Mud pH _____	Night Shift- _____
Mud Temp (F): IN _____ OUT _____	Driller <u>LaOrange</u>
LC. @ _____	Helper <u>Rose</u>
Bits: _____	Helper <u>K.L.</u>
_____	Foreman <u>Cunningham</u>
_____	Drilling Mgr <u>Wicklund</u>

Additional Information: WAITING ON CEMENT (WOC) TO SET AND
DRILLING CEMENT TO 2371 FEET.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 5/8"</u>	<u>1996 to 1998</u>	<u>5"* (0-1998)</u>	<u>1035/14#</u>
_____	_____ to _____	_____	_____

*NOTE: 5" CASING USED AS A LATERAL SUPPORT FOR THE 101mm WIRELINE
DRILLING OPERATIONS.

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 8-09-90
 Period End 0700 8-10-90
 Depth Start 2505
 Depth End 2540
 Footage 35 ft.
 Mud Wt 8.2
 Mud Vis 37
 Mud pH 10
 Mud Temp(F):IN 36 OUT N/A
 LC. @ _____

Bits: _____

Date 08-10-90
 Spud Date 06-01-90
 Day # 71
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Hanson
 Helper J.K.
 Helper _____
 Night Shift- _____
 Driller LaOrange
 Helper Rose
 Helper K.L.
 Foreman Cunningham
 Drilling Mgr Wicklund

Additional Information: DRILLING CEMENT - STILL SOFT @ 2481 FT.
WAITED 4 HOURS AND DRILLED CEMENT OUT TO 2505 FT. DRILLING
AHEAD TO 2540 FT. HOLE AT PRESENT TIME APPEARS TO BE STABLE.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 5/8"</u>	<u>1996 to 1998</u>	<u>5"* (0-1998)</u>	<u>1035/14#</u>
_____	_____ to _____	_____	_____

*NOTE: 5" CASING USED AS A LATERAL SUPPORT FOR THE 101mm WIRELINE
DRILLING OPERATIONS.

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 8-10-90
 Period End 0700 8-11-90
 Depth Start 2540
 Depth End 2645
 Footage 105 ft.
 Mud Wt 8.1
 Mud Vis 37
 Mud pH 10
 Mud Temp (F): IN 36 OUT N/A
 LC. @ _____
 Bits: _____

Date 08-11-90
 Spud Date 06-01-90
 Day # 72
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Hanson
 Helper J.K.
 Helper _____
 Night Shift- _____
 Driller LaOrange
 Helper Rose
 Helper _____
 Foreman Cunningham
 Drilling Mgr Wicklund

Additional Information: TEMPERATURE OF MRT'S AT 2582' AND 2600'
LESS THAN 100° (F). WATER LEVEL AT 600' (PLUS OR MINUS 20').
HIT SAND AT 2582' AND IN IT FOR MOST OF THE DRILLING TO 2645'.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 5/8"</u>	<u>1996 to 1998</u>	<u>5"* (0-1998)</u>	<u>1035/14#</u>
_____	_____ to _____	_____	_____

*NOTE: 5" CASING USED AS A LATERAL SUPPORT FOR THE 101mm WIRELINE
DRILLING OPERATIONS.

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 8-11-90
 Period End 0700 8-12-90
 Depth Start 2645
 Depth End 2671
 Footage 26 ft.
 Mud Wt 8.1
 Mud Vis 37
 Mud pH 10
 Mud Temp(F): IN 76 OUT N/A
 LC. @ _____
 Bits: _____

Date 08-12-90
 Spud Date 06-01-90
 Day # 73
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Hanson
 Helper J.K.
 Helper _____
 Night Shift- _____
 Driller LaOrange
 Helper Rose
 Helper _____
 Foreman Cunningham
 Drilling Mgr Wicklund

Additional Information: DRILLING HARD & SOFT BANDS OF SAND FROM 2645' TO 2671' (26 FEET). TRIP OUT TO CEMENT HOLE. TRIP IN WITH NO WIRELINE RODS ON THE BOTTOM OF 101mm DRILL STRING & CEMENTED HOLE. TRIP OUT AND START BACK IN WITH 101mm CORE BARREL.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 5/8"</u>	<u>1996 to 1998</u>	<u>5"* (0-1998)</u>	<u>1035/14#</u>
_____	_____ to _____	_____	_____

*NOTE: 5" CASING USED AS A LATERAL SUPPORT FOR THE 101mm WIRELINE DRILLING OPERATIONS.

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 8-12-90
 Period End 0700 8-13-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt _____
 Mud Vis _____
 Mud pH _____
 Mud Temp (F): IN _____ OUT _____
 LC. @ _____
 Bits: _____

Date 08-13-90
 Spud Date 06-01-90
 Day # 74
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Hanson
 Helper J.K.
 Helper _____
 Night Shift- _____
 Driller LaOrange
 Helper Rose
 Helper _____
 Foreman Cunningham
 Drilling Mgr Wicklund

Additional Information: WHILE LOWERING RODS TO DRILL OUT CEMENT, THEY BECAME STUCK AT 2230' (WHERE LOST CIRCULATION OCCURRED WHILE DIAMOND DRILLING AFTER 7" CASING WAS SET). WERE ABLE TO ROTATE & MOVE UP & DOWN FOR A WHILE, BUT FINALLY LOCKED UP. CORE BARREL IS 400' OFF BOTTOM OF HOLE.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0</u> to <u>202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>8 1/2"</u>	<u>202</u> to <u>1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 5/8"</u>	<u>1996</u> to <u>1998</u>	<u>5"* (0-1998)</u>	<u>1035/14#</u>
_____	_____ to _____	_____	_____

*NOTE: 5" CASING USED AS A LATERAL SUPPORT FOR THE 101mm WIRELINE DRILLING OPERATIONS.

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # <u>SOH-1</u>	Date <u>08-14-90</u>
Period Start <u>0700 8-13-90</u>	Spud Date <u>06-01-90</u>
Period End <u>0700 8-14-90</u>	Day # <u>75</u>
Depth Start _____	Contractor/Rig <u>Tonto/U-5000</u>
Depth End _____	Day Shift- _____
Footage _____	Driller <u>Hanson</u>
Mud Wt _____	Helper <u>K.K.</u>
Mud Vis _____	Helper _____
Mud pH _____	Night Shift- _____
Mud Temp (F): IN _____ OUT _____	Driller <u>Cunningham</u>
LC. @ _____	Helper <u>Rose</u>
Bits: _____	Helper <u>J.K.</u>
_____	Foreman <u>Fierback</u>
_____	Drilling Mgr <u>Wicklund</u>

Additional Information: HAULING NO DRILL PIPE FROM STORAGE SITE.
CLEAN RODS AND MAKE UP DRILL STRING. CUT CORE BARREL OFF 3 FEET
BEHIND BIT. CUT PIECE FELL DOWN THE HOLE - CONTINUE FISHING
OPERATIONS.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0</u> to <u>202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>8 1/2"</u>	<u>202</u> to <u>1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 5/8"</u>	<u>1996</u> to <u>1998</u>	<u>5"* (0-1998)</u>	<u>1035/14#</u>
_____	_____ to _____	_____	_____

*NOTE: 5" CASING USED AS A LATERAL SUPPORT FOR THE 101mm WIRELINE
DRILLING OPERATIONS.

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # <u>SOH-1</u>	Date <u>08-15-90</u>
Period Start <u>0700 8-14-90</u>	Spud Date <u>06-01-90</u>
Period End <u>0700 8-15-90</u>	Day # <u>76</u>
Depth Start _____	Contractor/Rig <u>Tonto/U-5000</u>
Depth End _____	Day Shift- _____
Footage _____	Driller <u>Hanson</u>
Mud Wt _____	Helper <u>K.K.</u>
Mud Vis _____	Helper _____
Mud pH _____	Night Shift- _____
Mud Temp (F): IN _____ OUT _____	Driller <u>Cunningham</u>
LC. @ _____	Helper <u>Rose</u>
	Helper <u>J.K.</u>
Bits: <u>1-101mm cutter blade</u>	Foreman <u>Fierback</u>
	Drilling Mgr <u>Wicklund</u>

Additional Information: CUT DRILL PIPE ABOVE CORE BARREL AND THEY DID NOT COME LOOSE. CUT RODS AT 2140 FEET - STILL NOT LOOSE. CUT RODS AT 1995 FEET AND PULLED SAME FROM HOLE. TRIED TO JAR STUCK PIPE WITH CUT PIPE, BUT WOULD NOT MOVE.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 5/8"</u>	<u>1996 to 1998</u>	<u>5"* (0-1998)</u>	<u>1035/14#</u>
_____	_____ to _____	_____	_____

*NOTE: 5" CASING USED AS A LATERAL SUPPORT FOR THE 101mm WIRELINE DRILLING OPERATIONS.

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 8-15-90
 Period End 0700 8-16-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt _____
 Mud Vis _____
 Mud pH _____
 Mud Temp (F): IN _____ OUT _____
 LC. @ _____
 Bits: 1-101mm #L-71312
1-101mm #L-68311
1-101mm complete outer core
barrel, 240' 101mm drill rods
1-diamond drill cutter blade

Date 08-16-90
 Spud Date 06-01-90
 Day # 77
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Hanson
 Helper K.K.
 Helper _____
 Night Shift- _____
 Driller Cunningham
 Helper Rose
 Helper J.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: PLACE ADAPTER ON NO RODS AND LOWER INTO
101mm DRILL RODS. PUMP LCM AND GOT RETURNS BACK - PULL NO RODS.
PULL 134mm CASING AND LAYING DOWN. START MAKING UP 134mm DRILL
STRING TO REAM OVER 101mm STUCK PIPE.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0</u> to <u>202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>8 1/2"</u>	<u>202</u> to <u>1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 5/8"</u>	<u>1996</u> to <u>1998</u>	<u>5"* (0-1998)</u>	<u>1035/14#</u>
_____	_____ to _____	_____	_____

*NOTE: 5" CASING USED AS A LATERAL SUPPORT FOR THE 101mm WIRELINE
DRILLING OPERATIONS.

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 8-16-90
 Period End 0700 8-17-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt 8.2
 Mud Vis 40
 Mud pH 9
 Mud Temp (F): IN ____ OUT ____
 LC. @ _____
 Bits: 1-134mm #L-71770

Date 08-17-90
 Spud Date 06-01-90
 Day # 78
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Hansen
 Helper K.K.
 Helper Ruark
 Night Shift- _____
 Driller Cunningham
 Helper Rose
 Helper J.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: MAKE UP 134mm DRILL STRING & LOWER DOWN HOLE. BIT KEPT HANGING UP ON 7" PIPE JOINTS. DRILL THROUGH FLOAT SHOE AND GUIDE SHOE. REAMING HOLE FROM 1996 TO 2009 FEET (13 FEET). SLOW DRILLING BECAUSE OF HARD, FRACTURED, DIKE MATERIAL IN THIS INTERVAL.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>		
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
	<u>to</u>		

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 8-17-90
 Period End 0700 8-18-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt 8.4
 Mud Vis 38
 Mud pH 9
 Mud Temp (F): IN _____ OUT _____
 LC. @ _____
 Bits: 1-134mm casing bit
#L-71794

Date 08-18-90
 Spud Date 06-01-90
 Day # 79
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Hansen
 Helper K.K.
 Helper Ruark
 Night Shift- _____
 Driller Cunningham
 Helper Rose
 Helper J.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: REAM HOLE FROM 2009 TO 2016 FEET (7 FT).
 BIT WIPED OUT IN DRILLING HARD, BROKEN, DIKE FORMATION. PULLED
 FOR BIT CHANGE AND HAD TO REDRILL FROM 1996 TO 2016 FEET (20 FT)
 BECAUSE GAUGE HAD GONE ON PREVIOUS BIT. REAMED TO 2024 FEET.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>		
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 3/4"</u>	<u>1996 to 2016</u>		

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 8-18-90
 Period End 0700 8-19-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt 8.4
 Mud Vis 39
 Mud pH 9
 Mud Temp(F): IN _____ OUT _____
 LC. @ _____
 Bits: 1-134mm bit #L-71795

Date 08-19-90
 Spud Date 06-01-90
 Day # 80
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Hansen
 Helper K.K.
 Helper Ruark
 Night Shift- _____
 Driller Cunningham
 Helper Rose
 Helper J.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: CONTINUE REAMING OPERATIONS. SLOW
DRILLING, RUINED BIT. REAMING OPERATIONS DOWN TO 2039 FEET.
HAVE CHANGED BIT DESIGN & NEW BITS SHOULD ARRIVE ON MONDAY
THE 19TH AND SHOULD CUT AT A FASTER PENETRATION RATE.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0</u> to <u>202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202</u> to <u>1996</u>	_____	_____
<u>8 1/2"</u>	<u>202</u> to <u>1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 8-19-90
 Period End 0700 8-20-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt 8.5
 Mud Vis 42
 Mud pH 10
 Mud Temp (F): IN 76 OUT N/A
 LC. @ _____

Bits: _____

Date 08-20-90
 Spud Date 06-01-90
 Day # 81
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Hansen
 Helper K.K.
 Helper Ruark
 Night Shift- _____
 Driller Cunningham
 Helper Rose
 Helper J.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: REAMING OVER STUCK RODS FROM 2039 TO 2060 FEET (21 FT). LOSING 25 TO 50 PERCENT CIRCULATION.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>	_____	_____
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
_____	_____ to _____	_____	_____

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 8-20-90
 Period End 0700 8-21-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt 8.4
 Mud Vis 42
 Mud pH 10
 Mud Temp (F): IN 75 OUT N/A
 LC. @ _____
 Bits: _____

Date 08-21-90
 Spud Date 06-01-90
 Day # 82
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Hansen
 Helper K.K.
 Helper Ruark
 Night Shift- _____
 Driller Cunningham
 Helper Rose
 Helper J.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: REAM 2060 TO 2063 FEET - BIT PLAYED OUT.
PULL PIPE BACK INTO CASING AND WAITING ON BITS TO ARRIVE FROM
SALT LAKE CITY, UTAH.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>	_____	_____
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 1/4"</u>	<u>1996 to 2063</u>	<u>N/A</u>	<u>N/A</u>

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 8-21-90
 Period End 0700 8-22-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt 8.4
 Mud Vis 42
 Mud pH 10
 Mud Temp(F): IN 78 OUT N/A
 LC. @ _____
 Bits: 1-134mm casing bit
#71923

Date 08-22-90
 Spud Date 06-01-90
 Day # 83
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Hansen
 Helper K.K.
 Helper Ruark
 Night Shift- _____
 Driller Cunningham
 Helper Rose
 Helper J.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: REAMING FROM 2063 TO 2072 FEET (9 FT)
AND BIT DESTROYED BY HARD ABRASIVE ROCK.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>		
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 1/4"</u>	<u>1996 to 2072</u>	<u>N/A</u>	<u>N/A</u>

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 8-22-90
 Period End 0700 8-23-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt 8.4
 Mud Vis 42
 Mud pH 10
 Mud Temp(F): IN 77 OUT N/A
 LC. @ _____
 Bits: 1-134mm casing bit
#71924

Date 08-23-90
 Spud Date 06-01-90
 Day # 84
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Hansen
 Helper K.K.
 Helper Ruark
 Night Shift- _____
 Driller Cunningham
 Helper Rose
 Helper J.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: REAMING FROM 2072 TO 2086 FEET (14 FT).
LOSING UP TO 50% CIRCULATION.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>		
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 3/4"</u>	<u>1996 to 2086</u>	<u>N/A</u>	<u>N/A</u>

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 8-23-90
 Period End 0700 8-24-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt 8.4
 Mud Vis 39
 Mud pH 9
 Mud Temp (F): IN 75 OUT N/A
 LC. @ _____
 Bits: _____

Date 08-24-90
 Spud Date 06-01-90
 Day # 85
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Hansen
 Helper K.K.
 Helper Ruark
 Night Shift- _____
 Driller Cunningham
 Helper Rose
 Helper J.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: REAMING OVER STUCK DRILL PIPE FROM 2086 TO 2118 FEET (32 FT). ROCK KEEPS BINDING IN BETWEEN 101mm DRILL PIPE AND 134mm DRILL PIPE. WHENEVER A 200 POUND PRESSURE BUILD UP OCCURS, CIRCULATION LOSS IS UP TO 50%. LAST CASING BIT HAS BEEN USED FOR 40 FEET AND STILL IN USE.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>		
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 1/4"</u>	<u>1996 to 2118</u>	<u>N/A</u>	<u>N/A</u>

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 8-24-90
 Period End 0700 8-25-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt 8.4
 Mud Vis 40
 Mud pH 9
 Mud Temp(F): IN 76 OUT N/A
 LC. @ _____
 Bits: 1-134mm casing bit
#71925

Date 08-25-90
 Spud Date 06-01-90
 Day # 86
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Hansen
 Helper K.K.
 Helper Ruark
 Night Shift- _____
 Driller Cunningham
 Helper Rose
 Helper J.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: REAMING OVER STUCK DRILL PIPE FROM 2118 TO 2138 FEET (20 FT). PULL OUT FOR BIT CHANGE AT 2123 FEET. DRILL PIPE TENDS TO LOCK UP (134mm) WHILE OVERCORING THE 101mm PIPE. DIKE ROCK HIGHLY FRACTURED AND BRITTLE AND WHILE BEING DRILLED SEEMS TO SPINTER AND CAUSE THE DRILL PIPE TO LOCK UP.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>		
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 1/4"</u>	<u>1996 to 2138</u>	<u>N/A</u>	<u>N/A</u>

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 8-25-90
 Period End 0700 8-26-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt 8.4
 Mud Vis 37
 Mud pH 10
 Mud Temp(F): IN 77 OUT N/A
 LC. @ _____
 Bits: _____

Date 08-26-90
 Spud Date 06-01-90
 Day # 87
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Hansen
 Helper K.K.
 Helper Ruark
 Night Shift- _____
 Driller Cunningham
 Helper Rose
 Helper J.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: REAMING OVER STUCK RODS. HAVE DRILLED THROUGH THE DIKE (200 FT). HAVE 64 FEET TO DRILL TO REAM OVER CORE BARREL.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>		
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 1/4"</u>	<u>1996 to 2170</u>	<u>N/A</u>	<u>N/A</u>

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 8-26-90
 Period End 0700 8-27-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt 8.3
 Mud Vis 40
 Mud pH 10
 Mud Temp(F): IN 76 OUT N/A
 LC. @ _____
 Bits: _____

Date 08-27-90
 Spud Date 06-01-90
 Day # 88
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Hansen
 Helper K.K.
 Helper Ruark
 Night Shift- _____
 Driller Cunningham
 Helper Rose
 Helper J.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: REAMING OVER STUCK RODS FROM 2170 TO 2213 FEET (43 FT). 101mm HAD PREVIOUSLY BEEN CUT AT 2213 FEET, BUT WERE NOT FREE AT THAT TIME. LOWERING FISHING TOOL ON NO DRILL PIPE AND RETRIEVING 101mm AT 2213 FEET. OFF SETS IN CUTS OF 101 mm DRILL PIPE SUBSTANTIATE THEORY THAT GROUND SHIFTED AND STUCK DRILL PIPE.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>		
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 1/4"</u>	<u>1996 to 2213</u>	<u>N/A</u>	<u>N/A</u>

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 8-27-90
 Period End 0700 8-28-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt 8.3
 Mud Vis 40
 Mud pH 9
 Mud Temp(F): IN 77 OUT N/A
 LC. @ _____
 Bits: 1-134mm casing bit
 #L-71926
 101 Bolen Grapple
 (fishing tool)

Date 08-28-90
 Spud Date 06-01-90
 Day # 89
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller LaOrange
 Helper K.K.
 Helper Ruark
 Night Shift- _____
 Driller Cunningham
 Helper Rose
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: FISHING FOR 101mm DRILL PIPE WITH BOLEN
SPEAR. RECOVERED 140 FT. IN GOOD CONDITION. REAM OVER 101mm
DRILL PIPE FROM 2213 TO 2218 FEET WHERE BIT PLAYED OUT. TRIP
RODS FOR NEW BIT.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>		
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 1/4"</u>	<u>1996 to 2218</u>	<u>N/A</u>	<u>N/A</u>

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 8-28-90
 Period End 0700 8-29-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt 8.4
 Mud Vis 38
 Mud pH 9
 Mud Temp (F) : IN 78 OUT N/A
 LC. @ _____
 Bits: _____

Date 08-29-90
 Spud Date 06-01-90
 Day # 90
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller LaOrange
 Helper K.K.
 Helper Ruark
 Night Shift- _____
 Driller Cunningham
 Helper Rose
 Helper J.K.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: REAMING OVER 101mm DRILL PIPE AND CORE
 BARREL FROM 2218 TO 2230 FEET (12 FT).

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>	_____	_____
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 1/4"</u>	<u>1996 to 2230</u>	<u>N/A</u>	<u>N/A</u>

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 8-29-90
 Period End 0700 8-30-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt 8.4
 Mud Vis 37
 Mud pH 8
 Mud Temp(F):IN 76 OUT N/A
 LC. @ _____
 Bits: 1-2 15/16" tricone
rock bit

Date 08-30-90
 Spud Date 06-01-90
 Day # 91
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller LaOrange
 Helper K.K.
 Helper Ruark
 Night Shift- _____
 Driller Cunningham
 Helper Rose
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: RECOVERED 20 FEET OF 101mm DRILL PIPE
AND 101mm CORE BARREL WHICH ARE NOT USABLE. FISHING FOR 2'8"
PIECE OF CORE BARREL AND BIT AND SHELL (NO LUCK).

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>	_____	_____
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 1/4"</u>	<u>1996 to 2230</u>	<u>N/A</u>	<u>N/A</u>

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 8-30-90
 Period End 0700 8-31-90
 Depth Start
 Depth End
 Footage
 Mud Wt 8.4
 Mud Vis 39
 Mud pH 8
 Mud Temp(F): IN 77 OUT N/A
 LC. @
 Bits: 1-5 7/8" Tricone
 #111099

Date 08-31-90
 Spud Date 06-01-90
 Day # 92
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller LaOrange
 Helper K.K.
 Helper Ruark
 Night Shift-
 Driller Cunningham
 Helper Rose
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: FISHING FOR 2'8" PIECE OF CORE BARREL WHICH HAD BEEN CUT OFF. DRILLED OUT LCM AND SAND INSIDE OF CORE BARREL PIECE. RETRIEVE CORE BARREL SECTION (101mm CORE BIT #L-71312 AND SHELL #L-68311 IN REUSABLE CONDITION). OPEN HOLE WITH 5 7/8" TRICONE BIT ON 134mm DRILL PIPE FROM 1996 TO 2010 FEET (14 FT).

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>		
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 1/4"</u>	<u>1996 to 2230</u>	<u>N/A</u>	<u>N/A</u>

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 8-31-90
 Period End 0700 9-01-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt 8.5
 Mud Vis 40
 Mud pH 9
 Mud Temp(F): IN 76 OUT N/A
 LC. @ _____
 Bits: _____

Date 09-01-90
 Spud Date 06-01-90
 Day # 93
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller LaOrange
 Helper K.K.
 Helper Ruark
 Night Shift- _____
 Driller Cunningham
 Helper Rose
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: OPENING 4" HOLE TO 5 7/8" FROM 2010 TO 2082 FEET (72 FT).

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>		
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 1/4"</u>	<u>1996 to 2230*</u>		
<u>5 7/8"</u>	<u>1996 to 2082</u>		

* REAMING OVER STUCK DRILL PIPE AND CORE BARREL.

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 9-01-90
 Period End 0700 9-02-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt 8.4
 Mud Vis 40
 Mud pH 8
 Mud Temp (F): IN 77 OUT N/A
 LC. @ _____
 Bits: _____

Date 09-02-90
 Spud Date 06-01-90
 Day # 94
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller LaOrange
 Helper K.K.
 Helper Ruark
 Night Shift- _____
 Driller Cunningham
 Helper Rose
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: OPENING UP 5 1/4" HOLE TO 5 7/8" FROM 2082 TO 2152 FEET (70 FT). SLOW DRILLING DUE TO HARD DIKE ROCK.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>		
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 1/4"</u>	<u>1996 to 2230*</u>		
<u>5 7/8"</u>	<u>1996 to 2152</u>		

* REAMING OVER STUCK DRILL PIPE AND CORE BARREL.

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 9-02-90
 Period End 0700 9-03-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt 8.4
 Mud Vis 39
 Mud pH 8
 Mud Temp (F): IN 76 OUT N/A
 LC. @ _____
 Bits: 1-5 7/8" Tricone bit
#1111101

Date 09-03-90
 Spud Date 06-01-90
 Day # 95
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller LaOrange
 Helper K.K.
 Helper Ruark
 Night Shift- _____
 Driller Cunningham
 Helper Rose
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: OPEN 4" HOLE FROM 2152 TO 2183 FEET
(31 FT). TRIPPED DRILL PIPE FOR BIT CHANGE. NEW BIT OUT OF
GAUGE (LARGER) FROM PREVIOUS TRICONE BIT USED & HAD TO REAM
FROM 1996 TO 2156 FEET.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>	_____	_____
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 1/4"</u>	<u>1996 to 2230*</u>	_____	_____
<u>5 7/8"</u>	<u>1996 to 2156</u>	_____	_____

* REAMING OVER STUCK DRILL PIPE AND CORE BARREL.

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 9-03-90
 Period End 0700 9-04-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt 8.4
 Mud Vis 39
 Mud pH 9
 Mud Temp(F): IN 78 OUT N/A
 LC. @ _____
 Bits: _____

Date 09-04-90
 Spud Date 06-01-90
 Day # 96
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller LaOrange
 Helper K.K.
 Helper Ruark
 Night Shift- _____
 Driller Cunningham
 Helper Rose
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: OPENING 5 1/4" HOLE TO 5 7/8" FROM 2183 TO 2230 FEET (47 FEET). OPENING 4" HOLE TO 5 7/8" FROM 2230 TO 2277 FEET (47 FT).

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>		
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 1/4"</u>	<u>1996 to 2230*</u>		
<u>5 7/8"</u>	<u>1996 to 2277</u>		

* REAMING OVER STUCK DRILL PIPE AND CORE BARREL.

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 9-04-90
 Period End 0700 9-05-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt 8.4
 Mud Vis 41
 Mud pH 9
 Mud Temp(F): IN 77 OUT N/A
 LC. @ 2230
 Bits: _____

Date 09-05-90
 Spud Date 06-01-90
 Day # 97
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller LaOrange
 Helper K.K.
 Helper Ruark
 Night Shift- _____
 Driller Cunningham
 Helper Rose
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: OPENING 4" HOLE TO 5 7/8" FROM 2277 TO 2369 FEET (92 FT). LOSING CIRCULATION THROUGH OUT THIS INTERVAL. HAD 70% RETURNS AT 2369 FEET.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>		
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 1/4"</u>	<u>1996 to 2230*</u>		
<u>5 7/8"</u>	<u>1996 to 2369</u>		

* REAMING OVER STUCK DRILL PIPE AND CORE BARREL.

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 9-05-90
 Period End 0700 9-06-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt 8.4
 Mud Vis 40
 Mud pH 9
 Mud Temp(F): IN 77 OUT N/A
 LC. @ _____
 Bits: _____

Date 09-06-90
 Spud Date 06-01-90
 Day # 98
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller LaOrange
 Helper K.K.
 Helper Ruark
 Night Shift-
 Driller Cunningham
 Helper Rose
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: OPENING 4" HOLE TO 5 7/8" FROM 2369 TO
2451 FEET (82 FT). LOSING SOME FLUID IN CIRCULATING SYSTEM
WHILE DRILLING.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>		
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 7/8"</u>	<u>1996 to 2451</u>	<u>N/A</u>	<u>N/A</u>

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 9-06-90
 Period End 0700 9-07-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt IN: 8.5 OUT: 8.3
 Mud Vis IN: 42 OUT: 35
 Mud pH IN: 11 OUT: 10
 Mud Temp(F): IN 78 OUT N/A
 LC. @ _____
 Bits: 1-5 7/8" Tricone bit
#104835

Date 09-07-90
 Spud Date 06-01-90
 Day # 99
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller LaOrange
 Helper K.K.
 Helper Ruark
 Night Shift- _____
 Driller Cunningham
 Helper Rose
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: OPEN 4" HOLE TO 5 7/8" FROM 2451 TO 2506 FEET (55 FT). LOSING CIRCULATION AND MUD BEING DILUTED (NOTE MUD PROPERTIES). HAD TO PULL PIPE BACK 80 FEET FROM BOTTOM BEFORE THEY WERE LOOSE FROM A ROCK WHICH HAD SPALLED FROM THE WALL OF THE HOLE. TRIP FOR NEW BIT.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 1996</u>		
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 7/8"</u>	<u>1996 to 2506</u>		

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 9-07-90
 Period End 0700 9-08-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt 8.4
 Mud Vis 37
 Mud pH 8
 Mud Temp(F): IN 77 OUT N/A
 LC. @ _____
 Bits: _____

Date 09-08-90
 Spud Date 06-01-90
 Day # 100
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller LaOrange
 Helper K.K.
 Helper Ruark
 Night Shift- _____
 Driller Cunningham
 Helper Rose
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: HOLE COLLAPSED WHILE TRIPPING FOR A
5 7/8" BIT. HAD TO REAM AND WASH ROCK FRAGMENTS FROM 1996 TO
2500 FEET (504 FT). CONDITIONS SIMILAR AS TO WHEN 101mm DRILL
PIPE BECAME STUCK AUGUST 12th.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 2671</u>		
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 7/8"</u>	<u>1996 to 2506</u>		

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 9-08-90
 Period End 0700 9-09-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt IN 8.5 OUT 8.5
 Mud Vis IN 38 OUT 36
 Mud pH IN 10 OUT 10
 Mud Temp(F): IN 78 OUT N/A
 LC. @ _____
 Bits: _____

Date 09-09-90
 Spud Date 06-01-90
 Day # 101
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller LaOrange
 Helper K.K.
 Helper Ruark
 Night Shift- _____
 Driller Cunningham
 Helper Rose
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: CLEAN HOLE UP FROM 2500 TO 2506 FEET
(6 FT). OPEN 4" HOLE TO 5 7/8" FROM 2506 TO 2600 FEET (94 FT).
DRILLING FLUID PROPERTIES ON INFLOW AND OUTFLOW ARE NOT AS
PRONOUNCED AS ON REPORT #99 (09-07-90).

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 2671</u>		
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 7/8"</u>	<u>1996 to 2600</u>		

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 9-09-90
 Period End 0700 9-10-90
 Depth Start _____
 Depth End _____
 Footage _____
 Mud Wt 8.4
 Mud Vis IN 40 OUT 37
 Mud pH 8
 Mud Temp (F): IN 78 OUT N/A
 LC. @ _____
 Bits: _____

Date 09-10-90
 Spud Date 06-01-90
 Day # 102
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller LaOrange
 Helper K.K.
 Helper Ruark
 Night Shift- _____
 Driller Cunningham
 Helper Rose
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: OPEN 4" HOLE TO 5 7/8" FROM 2600 TO 2671 FEET (71 FT). CONDITION HOLE AND PULL PIPE. AT 2441 FT RODS BECAME STUCK. LOOSEN PIPE AND REAMING OUT OF HOLE. VISCOSITY PROBABLY BEING DILUTED DUE TO SALT WATER AT DEPTH.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 2671</u>		
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 7/8"</u>	<u>1996 to 2671</u>		

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 9-10-90
 Period End 0700 9-11-90
 Depth Start 2671 ft.
 Depth End 2717 ft.
 Footage 46
 Mud Wt 8.3
 Mud Vis 40
 Mud pH 10
 Mud Temp(F): IN 77 OUT N/A
 LC. @ _____
 Bits: 1-134mm bit #L-71870
1-134mm shell #L-71298

Date 09-11-90
 Spud Date 06-01-90
 Day # 103
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Fierback
 Helper J.K.
 Helper Ruark
 Night Shift- _____
 Driller LaOrange
 Helper K.K.
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: TRIP RODS OUT OF HOLE AND CHANGE OVER FROM TRICONING TO CORING WITH A 134mm CORE BARREL. DRILLING AHEAD FROM 2671 TO 2717 FEET (46 FT). THREE FEET OF CAVE AND SAND IN BOTTOM OF HOLE AFTER TRIPPING DRILL PIPE.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 2671</u>		
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 7/8"</u>	<u>1996 to 2671</u>		
<u>5.273"</u>	<u>2671 to 2717</u>	<u>N/A</u>	<u>N/A</u>

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 9-11-90
 Period End 0700 9-12-90
 Depth Start 2717 ft.
 Depth End 2738 ft.
 Footage 21
 Mud Wt 8.4
 Mud Vis 45
 Mud pH 7
 Mud Temp(F):IN 78 OUT N/A
 LC. @ _____
 Bits: 1-134mm bit #L-71871

Date 09-12-90
 Spud Date 06-01-90
 Day # 104
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Fierback
 Helper J.K.
 Helper Ruark
 Night Shift- _____
 Driller LaOrange
 Helper K.K.
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: TRIP RODS FOR BIT CHANGE. WASH 60 FEET
DOWN TO BOTTOM. PUMP LOST CIRCULATION MATERIAL TO MAINTAIN
CIRCULATION. CORING FROM 2717 TO 2738 FEET (21 FT) IN VERY
HARD, BROKEN, DIKE ROCK.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 2671</u>	_____	_____
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 7/8"</u>	<u>1996 to 2671</u>	_____	_____
<u>5.273"</u>	<u>2671 to 2738</u>	<u>N/A</u>	<u>N/A</u>

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 9-12-90
 Period End 0700 9-13-90
 Depth Start 2738 ft.
 Depth End 2770 ft.
 Footage 32
 Mud Wt 8.4
 Mud Vis 35
 Mud pH 10
 Mud Temp(F):IN 77 OUT N/A
 LC. @ _____
 Bits: 1-134mm bit #L-72641

Date 09-13-90
 Spud Date 06-01-90
 Day # 105
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Fierback
 Helper J.K.
 Helper Ruark
 Night Shift-
 Driller LaOrange
 Helper K.K.
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: CORING WITH 134mm FROM 2738 TO 2770 FEET
(32 FT). TRIP RODS FOR NEW BIT. WASH LAST 70 FEET TO BOTTOM.
PUMP LOST CIRCULATION MATERIAL TO REGAIN CIRCULATION.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 2671</u>		
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 7/8"</u>	<u>1996 to 2671</u>		
<u>5.273"</u>	<u>2671 to 2770</u>	<u>N/A</u>	<u>N/A</u>

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 9-13-90
 Period End 0700 9-14-90
 Depth Start 2770 ft.
 Depth End 2836 ft.
 Footage 66
 Mud Wt 8.3
 Mud Vis 35
 Mud pH 10
 Mud Temp(F): IN 78 OUT N/A
 LC. @ _____

Bits: _____

Date 09-14-90
 Spud Date 06-01-90
 Day # 106
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Fierback
 Helper J.K.
 Helper Ruark
 Night Shift-
 Driller LaOrange
 Helper K.K.
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: DRILLING AHEAD WITH 134mm BIT FROM 2770 TO 2836 FEET (66 FT). LOSING CIRCULATION FREQUENTLY AND USING LOST CIRCULATION MATERIAL TO GET RETURNS.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 2671</u>		
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 7/8"</u>	<u>1996 to 2671</u>		
<u>5.273"</u>	<u>2671 to 2836</u>	<u>N/A</u>	<u>N/A</u>

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 9-14-90
 Period End 0700 9-15-90
 Depth Start 2836 ft.
 Depth End 2865 ft.
 Footage 29
 Mud Wt 8.3
 Mud Vis 37
 Mud pH 9
 Mud Temp(F): IN 78 OUT N/A
 LC. @ 2812 ft. & 2827 ft.
 Bits: 1-134mm bit #L-72642

Date 09-15-90
 Spud Date 06-01-90
 Day # 107
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Fierback
 Helper J.K.
 Helper Ruark
 Night Shift-
 Driller LaOrange
 Helper K.K.
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: TRIP RODS FOR A BIT CHANGE. HIT CAVE*
AT 159 FEET FROM BOTTOM.
* CAVE MATERIAL MAKE UP OF ROCK AND SAND.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 2671</u>		
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 7/8"</u>	<u>1996 to 2671</u>		
<u>5.273"</u>	<u>2671 to 2865</u>	<u>N/A</u>	<u>N/A</u>

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 9-15-90
 Period End 0700 9-16-90
 Depth Start 2865 ft.
 Depth End 2868 ft.
 Footage 3
 Mud Wt 8.3
 Mud Vis 36
 Mud pH 8
 Mud Temp(F): IN 77 OUT N/A
 LC. @ _____
 Bits: 1-134mm bit #L-73246

Date 09-16-90
 Spud Date 06-01-90
 Day # 108
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Fierback
 Helper J.K.
 Helper Ruark
 Night Shift-
 Driller LaOrange
 Helper K.K.
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: AFTER DRILLING 3 FEET, BIT RUINED.
TRIP DRILL PIPE FOR NEW BIT AFTER GOING TO KONA TO PICK IT UP.
DRILL CAVE (SAND AND ROCK) BEFORE GETTING TO BOTTOM OF HOLE.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 2671</u>		
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 7/8"</u>	<u>1996 to 2671</u>		
<u>5.273"</u>	<u>2671 to 2868</u>	<u>N/A</u>	<u>N/A</u>

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 9-16-90
 Period End 0700 9-17-90
 Depth Start 2868 ft.
 Depth End 2896 ft.
 Footage 28
 Mud Wt 8.3
 Mud Vis 37
 Mud pH 8
 Mud Temp (F): IN 76 OUT N/A
 LC. @ _____
 Bits: 1-134mm bit #L-73245

Date 09-17-90
 Spud Date 06-01-90
 Day # 109
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Fierback
 Helper J.K.
 Helper Ruark
 Night Shift-
 Driller LaOrange
 Helper K.K.
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: TROUBLES IN RECOVERING GRAVEL TYPE SANDS. DRILLED 15 FEET AND BIT IS WIPED OUT. TRIP DRILL PIPE FOR BIT. DRILLING AHEAD FROM 2883 TO 2896 FEET. LOST CIRCULATION CONTINUES TO BE A PROBLEM.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>202 to 2671</u>		
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 7/8"</u>	<u>1996 to 2671</u>		
<u>5.273"</u>	<u>2671 to 2896</u>	<u>N/A</u>	<u>N/A</u>

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 9-17-90
 Period End 0700 9-18-90
 Depth Start 2896 ft.
 Depth End 2935 ft.
 Footage 39
 Mud Wt 8.3
 Mud Vis 37
 Mud pH 9
 Mud Temp (F): IN 76 OUT N/A
 LC. @ _____

 Bits: _____

Date 09-18-90
 Spud Date 06-01-90
 Day # 110
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Fierback
 Helper J.K.
 Helper Ruark
 Night Shift-
 Driller LaOrange
 Helper K.K.
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: CORING FROM 2896 TO 2935 FEET (39 FT)
IN SANDY & BADLY BROKEN VOLCANICS. LOST CIRCULATION CONTINUES
TO BE A PROBLEM REQUIRING LCM TO BE PUMPED BETWEEN CORE RUNS
TO MAINTAIN CIRCULATION. MAXIMUM READING THERMOMETER RUNS AT
2930 FEET ARE LESS THAN 100° (F).

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0</u> to <u>202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>0</u> to <u>2671</u>		
<u>8 1/2"</u>	<u>202</u> to <u>1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 7/8"</u>	<u>1996</u> to <u>2671</u>		
<u>5.273"</u>	<u>2671</u> to <u>2935</u>	<u>N/A</u>	<u>N/A</u>

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 9-18-90
 Period End 0700 9-19-90
 Depth Start 2935 ft.
 Depth End 2957 ft.
 Footage 22
 Mud Wt 8.3
 Mud Vis 37
 Mud pH 9
 Mud Temp(F):IN 76 OUT N/A
 LC. @ _____
 Bits: 1-134mm bit #L-73370

Date 09-19-90
 Spud Date 06-01-90
 Day # 111
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Fierback
 Helper J.K.
 Helper Ruark
 Night Shift-
 Driller LaOrange
 Helper K.K.
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: CORING FROM 2935 TO 2957 FEET (22 FT)
WITH 134mm CORE BARREL. BIT RUINED AT 2949 FEET - CONDITIONED
HOLE AND TRIP PIPE FOR NEW BIT. DRILL CAVE AND SAND TO GET TO
BOTTOM OF HOLE.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>0 to 2671</u>		
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 7/8"</u>	<u>1996 to 2671</u>		
<u>5.273"</u>	<u>2671 to 2957</u>	<u>N/A</u>	<u>N/A</u>

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 9-19-90
 Period End 0700 9-20-90
 Depth Start 2957 ft.
 Depth End 2993 ft.
 Footage 36
 Mud Wt 8.3
 Mud Vis 37
 Mud pH 9
 Mud Temp (F): IN 77 OUT N/A
 LC. @ _____
 Bits: _____

Date 09-20-90
 Spud Date 06-01-90
 Day # 112
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Fierback
 Helper J.K.
 Helper Ruark
 Night Shift-
 Driller LaOrange
 Helper K.K.
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: CORING AHEAD FROM 2957 TO 2993 FEET
(36 FT) WITH A 134mm CORE BARREL (5.271 INCHES).

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>0 to 2671</u>		
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 7/8"</u>	<u>1996 to 2671</u>		
<u>5.273"</u>	<u>2671 to 2993</u>	<u>N/A</u>	<u>N/A</u>

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # <u>SOH-1</u>	Date <u>09-21-90</u>
Period Start <u>0700 9-20-90</u>	Spud Date <u>06-01-90</u>
Period End <u>0700 9-21-90</u>	Day # <u>113</u>
Depth Start <u>2993 ft.</u>	Contractor/Rig <u>Tonto/U-5000</u>
Depth End <u>3022 ft.</u>	Day Shift- <u></u>
Footage <u>29</u>	Driller <u>Fierback</u>
Mud Wt <u>8.3</u>	Helper <u>J.K.</u>
Mud Vis <u>37</u>	Helper <u>Ruark</u>
Mud pH <u>9</u>	Night Shift- <u></u>
Mud Temp(F): IN <u>76</u> OUT <u>N/A</u>	Driller <u>LaOrange</u>
LC. @ <u></u>	Helper <u>K.K.</u>
	Helper <u>K.L.</u>
Bits: <u></u>	Foreman <u>Fierback</u>
	Drilling Mgr <u>Wicklund</u>

Additional Information: CORING WITH 134mm FROM 2992 TO 3022 FEET (29 FT). PULL DRILL PIPE TO BOTTOM OF 7" CASING PRIOR TO CHECKING FOR CAVE IN HOLE. HAD TO WASH AND REAM TO BOTTOM OF HOLE. BREAKING OUT RODS IN 20 FOOT LENGTHS PRIOR TO RUNNING 4 1/2" CASING.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>0 to 2671</u>	<u></u>	<u></u>
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 7/8"</u>	<u>1996 to 2671</u>	<u></u>	<u></u>
<u>134mm</u>	<u>2671 to 3022</u>	<u>N/A</u>	<u>N/A</u>

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # <u>SOH-1</u>	Date <u>09-22-90</u>
Period Start <u>0700 9-21-90</u>	Spud Date <u>06-01-90</u>
Period End <u>0700 9-22-90</u>	Day # <u>114</u>
Depth Start <u>3022 ft.</u>	Contractor/Rig <u>Tonto/U-5000</u>
Depth End _____	Day Shift- _____
Footage _____	Driller <u>Fierback</u>
Mud Wt _____	Helper <u>J.K.</u>
Mud Vis _____	Helper <u>Ruark</u>
Mud pH _____	Night Shift- _____
Mud Temp (F) : IN _____ OUT _____	Driller <u>LaOrange</u>
LC. @ _____	Helper <u>K.K.</u>
Bits: _____	Helper <u>K.L.</u>
_____	Foreman <u>Fierback</u>
_____	Drilling Mgr <u>Wicklund</u>

Additional Information: PULL REMAINDER OF 134mm DRILL PIPE IN 20 FOOT LENGTHS. MAKE UP FLOAT AND GUIDE SHOE AND LOWER 4 1/2" CASING. WASH AND LOWER CASING FROM 2960 TO 3022 FEET (62 FT). CEMENT HOLE AND WAIT ON CEMENT (WOC).

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>4.0"</u>	<u>0 to 2671</u>	_____	_____
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 7/8"</u>	<u>1996 to 2671</u>	_____	_____
<u>134mm</u>	<u>2671 to 3022</u>	<u>4 1/2" (0-3022)</u>	<u>J-55/10.5#</u>

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 9-22-90
 Period End 0700 9-23-90
 Depth Start 3022 ft.
 Depth End 3037 ft.
 Footage 15
 Mud Wt 8.3
 Mud Vis 37
 Mud pH 8
 Mud Temp(F):IN 77 OUT N/A
 LC. @ _____
 Bits: 1-HQ #M-6-3567419
 1-HQ Shell #331700
 1-3 15/16" tricone
 rock bit #45292

Date 09-23-90
 Spud Date 06-01-90
 Day # 115
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Fierback
 Helper J.K.
 Helper Ruark
 Night Shift- _____
 Driller LaOrange
 Helper K.K.
 Helper K.L.
 Foreman Fierback
 Drilling Mgr Wicklund

Additional Information: WAITING ON CEMENT (WOC) AND MAKE UP
HQ DRILL STRING. DRILL OUT FLOAT SHOE, 16 FEET OF CEMENT AND
GUIDE SHOE. FOOTAGE RATES ARE IN EFFECT AS OF 3037 FEET.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 7/8"</u>	<u>1996 to 2671</u>		
<u>134mm</u>	<u>2671 to 3022</u>	<u>4 1/2" (0-3022)</u>	<u>J-55/10.5#</u>
<u>4.0"</u>	<u>0 to 3037</u>		

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 9-23-90
 Period End 0700 9-24-90
 Depth Start 3037 ft.
 Depth End 3104 ft.
 Footage 67
 Mud Wt 8.3
 Mud Vis 37
 Mud pH 8
 Mud Temp(F): IN 78 OUT N/A
 LC. @ _____
 Bits: _____

Date 09-24-90
 Spud Date 06-01-90
 Day # 116
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Fierback
 Helper J.K.
 Helper Ruark/Kervin
 Night Shift-
 Driller LaOrange
 Helper K.K.
 Helper K.L.
 Foreman Fierback/Cunningham
 Drilling Mgr Wicklund

Additional Information: CORING WITH HQ WIRELINE FROM 3037 TO 3104 FEET (67 FT). BOTTOM HOLE TEMPERATURE LESS THAN 100⁰(F).

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 7/8"</u>	<u>1996 to 2671</u>		
<u>134mm</u>	<u>2671 to 3022</u>	<u>4 1/2" (0-3022)</u>	<u>J-55/10.5#</u>
<u>4.0"</u>	<u>0 to 3104</u>		

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 9-24-90
 Period End 0700 9-25-90
 Depth Start 3104 ft.
 Depth End 3172 ft.
 Footage 68
 Mud Wt 8.3
 Mud Vis 38
 Mud pH 8
 Mud Temp(F):IN 77 OUT N/A
 LC. @ _____
 Bits: _____

Date 09-25-90
 Spud Date 06-01-90
 Day # 117
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Cunningham
 Helper Kervin
 Helper J.K.
 Night Shift- _____
 Driller LaOrange
 Helper K.K.
 Helper K.L.
 Foreman Cunningham
 Drilling Mgr Wicklund

Additional Information: CORING AHEAD WITH HQ FROM 3104 TO 3172
FEET (68 FT). MAXIMUM READING THERMOMETERS (MRT'S) AT 3123
WERE 101°(F).

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 7/8"</u>	<u>1996 to 2671</u>		
<u>134mm</u>	<u>2671 to 3022</u>	<u>4 1/2" (0-3022)</u>	<u>J-55/10.5#</u>
<u>4.0"</u>	<u>0 to 3172</u>		

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 9-25-90
 Period End 0700 9-26-90
 Depth Start 3172 ft.
 Depth End 3231 ft.
 Footage 59
 Mud Wt 8.4
 Mud Vis 37
 Mud pH 9
 Mud Temp (F): IN 78 OUT N/A
 LC. @ _____
 Bits: _____

Date 09-26-90
 Spud Date 06-01-90
 Day # 118
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Cunningham
 Helper J.K.
 Helper Kervin
 Night Shift-
 Driller LaOrange
 Helper K.K.
 Helper K.L.
 Foreman Cunningham
 Drilling Mgr Wicklund

Additional Information: CORING FROM 3172 TO 3231 FEET (59 FT).
90% CIRCULATION TO SURFACE. BOTTOM HOLE TEMPERATURE AT 3231
FEET IS 108⁰(F).

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 7/8"</u>	<u>1996 to 2671</u>		
<u>134mm</u>	<u>2671 to 3022</u>	<u>4 1/2" (0-3022)</u>	<u>J-55/10.5#</u>
<u>4.0"</u>	<u>0 to 3231</u>		

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 9-26-90
 Period End 0700 9-27-90
 Depth Start 3231 ft.
 Depth End 3266 ft.
 Footage 35
 Mud Wt 8.4
 Mud Vis 37
 Mud pH 9
 Mud Temp(F): IN 77 OUT N/A
 LC. @ _____
 Bits: _____

Date 09-27-90
 Spud Date 06-01-90
 Day # 119
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Cunningham
 Helper K.M.
 Helper J.K.
 Night Shift-
 Driller LaOrange
 Helper K.K.
 Helper K.L.
 Foreman Cunningham
 Drilling Mgr Wicklund

Additional Information: TRIP DRILL PIPE FOR BIT. HAD TO REAM
LAST 130 FEET. HOLE CLEAN TO BOTTOM. FRACTURED ROCK WITH
SHORT RUNS. BOTTOM HOLE TEMPERATURE AT 3251 FEET 108⁰(F).
90% RETURN OF FLUID AT FLOW LINE.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 7/8"</u>	<u>1996 to 2671</u>		
<u>134mm</u>	<u>2671 to 3022</u>	<u>4 1/2" (0-3022)</u>	<u>J-55/10.5#</u>
<u>4.0"</u>	<u>0 to 3266</u>		

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 9-27-90
 Period End 0700 9-28-90
 Depth Start 3266 ft.
 Depth End 3308 ft.
 Footage 42
 Mud Wt 8.4
 Mud Vis 38
 Mud pH 9
 Mud Temp (F): IN 77 OUT N/A
 LC. @ _____

 Bits: _____

Date 09-28-90
 Spud Date 06-01-90
 Day # 120
 Contractor/Rig Tonto/U-5000
 Day Shift-
 Driller Cunningham
 Helper K.M.
 Helper J.K.
 Night Shift-
 Driller LaOrange
 Helper K.K.
 Helper K.L.
 Foreman Cunningham
 Drilling Mgr Wicklund

Additional Information: CORING AHEAD WITH HOWL FROM 3266 TO 3308 FEET (42 FT). BADLY BROKEN GROUND FROM 3275 TO 3308 FT. BIT WIPE OUT. TRIP PIPE FOR NEW BIT. 1 1/2 HOURS DRILLING CAVE TO GET TO BOTTOM. TEMPERATURE AT 3308 FEET 106°(F).

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 7/8"</u>	<u>1996 to 2671</u>		
<u>134mm</u>	<u>2671 to 3022</u>	<u>4 1/2" (0-3022)</u>	<u>J-55/10.5#</u>
<u>4.0"</u>	<u>0 to 3308</u>		

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 9-28-90
 Period End 0700 9-29-90
 Depth Start 3308 ft.
 Depth End 3329 ft.
 Footage 21
 Mud Wt 8.4
 Mud Vis 38
 Mud pH 9
 Mud Temp(F): IN 76 OUT N/A
 LC. @ _____

 Bits: _____

Date 09-29-90
 Spud Date 06-01-90
 Day # 121
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Cunningham
 Helper J.K.
 Helper K.M.
 Night Shift- _____
 Driller LaOrange
 Helper K.K.
 Helper K.L.
 Foreman Cunningham
 Drilling Mgr Wicklund

Additional Information: FRACTURED ROCK WIPED OUT ANOTHER BIT.
TRIP OUT FOR NEW BIT. DRILLING CAVE AND FRACTURED ROCK. LOST
CIRCULATION BUT GOT IT BACK. HOLE STILL CAVING IN HIGHLY
FRACTURED ROCK.

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 7/8"</u>	<u>1996 to 2671</u>		
<u>134mm</u>	<u>2671 to 3022</u>	<u>4 1/2" (0-3022)</u>	<u>J-55/10.5#</u>
<u>4.0"</u>	<u>0 to 3329</u>		

HAWAII NATURAL ENERGY INSTITUTE
DAILY DRILLING REPORT

Hole # SOH-1
 Period Start 0700 9-29-90
 Period End 0700 9-30-90
 Depth Start 3329 ft.
 Depth End 3346 ft.
 Footage 17
 Mud Wt 8.4
 Mud Vis 37
 Mud pH 9
 Mud Temp(F):IN 77 OUT N/A
 LC. @ _____
 Bits: 1-HQ bit #L-6313

Date 09-30-90
 Spud Date 06-01-90
 Day # 122
 Contractor/Rig Tonto/U-5000
 Day Shift- _____
 Driller Cunningham
 Helper K.M.
 Helper J.K.
 Night Shift- _____
 Driller LaOrange
 Helper K.K.
 Helper K.L.
 Foreman Cunningham
 Drilling Mgr Wicklund

Additional Information: TRIP RODS FOR NEW BIT (14 FT ON LAST BIT)
ROCK BADLY BROKEN (HAVE LOST CORE WHILE DRILLING AND ALSO DROPPED
OUT OF INTERTUBE WHILE RETRIEVING WHIC WOULD PREVENT CORE BARREL
FROM LANDING IN PLACE).

History

Hole Size	Interval (ft)	Casing Size (interval)	Grade/Weight
<u>12 1/4"</u>	<u>0 to 202</u>	<u>9-5/8" (0-202)</u>	<u>K-55/40#</u>
<u>8 1/2"</u>	<u>202 to 1996</u>	<u>7" (0-1996)</u>	<u>L-80/35#</u>
<u>5 7/8"</u>	<u>1996 to 2671</u>		
<u>134mm</u>	<u>2671 to 3022</u>	<u>4 1/2" (0-3022)</u>	<u>J-55/10.5#</u>
<u>4.0"</u>	<u>0 to 3346</u>		

APPENDIX B

COMPLAINT LOGS AND RESPONSE -- SOH 1

Public Contact Sheet

First Contact: answering service
mobile phone
walk-in
other

5
0
0
0

to office #

Specify-

Date 7-5-90 time _____

Nature of contact: request for information
complaint call

0

2

Residents name: Debbie Pommarenk
address :
phone number :

Contacted by, No call Date _____ time _____

Remarks:

Resident left message "noisy tonight at drill site"

Action taken: resident stated

No call back required ~~or requested~~

notified rig operator - operations normal

For: SOH

initiated by 7-5-90

date R. Kelly

Public Contact Sheet

First Contact: answering service ☒ to mobile
mobile phone ☐
walk-in ☐
other ☐ Specify-

Date 7-9-90 Time 0745

Nature of contact: request for information ☐
complaint call ☒

Residents name: Greg PemmuanK
address :
phone number :

Contacted by, R. Koehy Date 0900 time _____

Remarks:

Resident left message to call him.

Action taken:

Went by drill rig 0800 hrs to check on operations.
Hole being enlarged. Saw Greg 0900 at Pahoa Propane and
explained operations.

For: SOH

initiated by R. Koehy
date 7-9-90

Public Contact Sheet

First Contact: answering service ☐
mobile phone ☒ direct call
walk-in ☐
other ☐ Specify-

Date 7-15-90 Time 0645

Nature of contact: request for information ☐
complaint call ☒

Residents name: Greg Pommernik
address :
phone number :

Contacted by, R. Kocik Date same time same

Remarks:

Resident complained of night time noise, different sound.

Action taken:

I told him I would check on Rig operations and notify him 7-16-90 Am. (I was en route to Kona at time of call)
Follow up call 7-16-90 0930 to Mrs. Pommernik
(who called Answering service 7-15-90 0645) Answering Service
called me 7-16-90 0745.

For:

SOH

initiated by R. Kocik
date 7-16-90

Public Contact Sheet

First Contact: answering service
mobile phone
walk-in
other

☒ to mobile phone
☐
☐
☐ Specify-

Date 7-16-90 Time 0745

Nature of contact: request for information
complaint call

☐
☒

Residents name:
address :
phone number :

Contacted by, R. Kochy Date 7-16-90 time 10 Am

Remarks:

Call Debbie Pommernik - came in 0645 - 7-15
Call Bob Petricci - came in 752 pm - 7-15

Action taken:

went by Solt rig 8 Am to check on operations
new mud pump running, called residents +
explained new sound.
Planning dept. (R. Nakano) requested decible reading
on site, 11 Am. referred him to B. Borichand.

For:

Solt

initiated by R. Kaly
date 7-16-90

Public Contact Sheet

First Contact: answering service ☒ to mobile phone
mobile phone ☐
walk-in ☐
other ☐ Specify-

Date 7-17-90 Time 0820

Nature of contact: request for information ☐
complaint call ☒

Residents name: MRS. Pommeroy
address :
phone number : 965-8049

Contacted by, R. Ketch Date 7-17 time 10 Am

Remarks:

SOH rig noise woke her up at 4 A.M.

Action taken:

Noise level measurements on site (near fixed station) 66 db.
end of Cinder Road (access to rig) 37 db
Called resident 10 Am and told her additional plywood sound
barriers were being erected.

For:

SOH

initiated by R. Ketch

date 7-17-90

Public Contact Sheet

First Contact: answering service 0
mobile phone ☒ called direct
walk-in 0
other 0 Specify-

Date 7-19-90 Time 0635

Nature of contact: request for information 0
complaint call ☒

Residents name: Greg Pommerenk
address :
phone number : 965-8049

Contacted by, R. Kochy Date Same time Same.

Remarks:

Resident complained of night time noise.

Action taken:

I told resident about early Am noise level measurements taken
7-18-90 0500-0600 - less than 37db 200 yds from his house.
check with rig operator B. Cunningham 0740-0800
notified Art Seki, P. Wickland.

For:

SOH

initiated by R. Kochy
date 7-19-90

Public Contact Sheet

First Contact: answering service ☒ to office phone
mobile phone ☐
walk-in ☐
other ☐ Specify-

Date 7-23-90 Time 224 AM

Nature of contact: request for information ☐
complaint call ☒

Residents name: Mrs. Pommernik
address :
phone number : 965 8049

Contacted by, R. Kocny Date 7-23-90 time 0930 - left message I called

Remarks:

Rig noise woke her up - "something must be wrong"

Action taken:

Rig check 0800, complainant called rig also - operations normal
Return call to Resident at 4 PM - spoke to G. Pommernik.

For:

SCH.

initiated by R. Kocny

date 7-23-90

Public Contact Sheet

First Contact: answering service 0
mobile phone ☒ called direct
walk-in 0
other 0 Specify-

Date 7-23-90 Time 1030 Pm

Nature of contact: request for information 0
complaint call ☒

Residents name: Mrs. Pommernik
address :
phone number : 965-8049

Contacted by, R. Kocny Date 7-23-90 time 1032 Pm

Remarks:

mobile phone Rang - 5X - missed call, called ans. serv.
Mrs. Pommernik just called. Resident claims Rig noise
really loud, and annoying. She claims decibel Readings at
Jones Res. 60+ db.

Action taken:

Asked resident if she was requesting noise level measurements
she declined.

For: Sat

initiated by L. Kocny
date 7-23-90

AMBIENT NOISE SURVEY DATA SHEET

POSITION: SOH
ENGINEER: Koiky

DAY OF WEEK: Wed DATE: 7-18-90 TIME: BEGIN 0621
CAL: BEGIN _____

JOB NO. _____
FINISH: 0630
FINISH: _____
SKY: Overcast
WIND: 8-10 N
dBA L₁₀: _____
LIMITS, dBA: _____

NOTES AND SKETCH: Rig clearly audible.
Centrifugal pump not running (rig check)

Car lines on Road 46 db

Rig noise < 40 db. @ 37 db

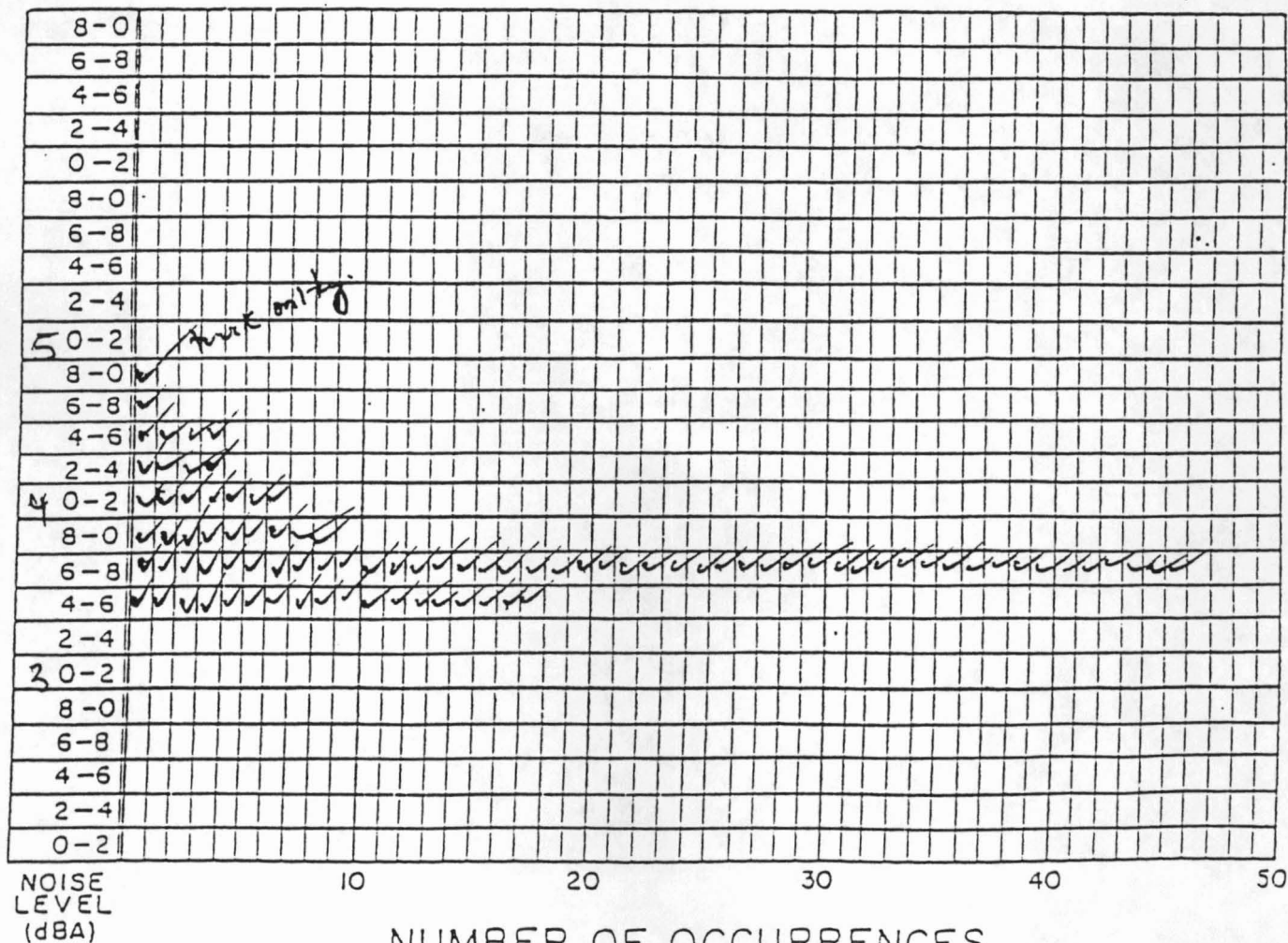
Closer to form. rig not visible.

Could hear operators talking

Tractor operating Makai

Total # Samples	Upper Limit	L ₁₀	Lower Limit
50	1st	5th	10th
100	5th	10th	17th
150	8th	15th	23rd
200	12th	20th	29th
250	16th	25th	35th
300	20th	30th	41st
350	25th	35th	47th

sample from the top



NUMBER OF OCCURRENCES

AMBIENT NOISE SURVEY DATA SHEET

POSITION: SOil
ENGINEER: Koch

DAY OF WEEK: Wed DATE: 7-18-90 TIME: BEGIN 0602 FINISH: 0612
CAL: BEGIN _____ FINISH: _____

NOTES AND SKETCH:

SKY: overcast
WIND: N < 5 mph
dBA L₁₀: _____
LIMITS, dBA: _____

Commerce - cane field. 400 yds (approx)
farm rig - rig visible - down roof just visible.

SOil motors + pumps clearly audible.
42-43 db. (mostly 39)

Cars 46
Trucks 52-55

Birds + crickets 42 db +
light rain - very calm.

Total # Samples	Upper Limit	L ₁₀	Lower Limit
50	1st	5th	10th
100	5th	10th	17th
150	8th	15th	23rd
200	12th	20th	29th
250	16th	25th	35th
300	20th	30th	41st
350	25th	35th	47th

sample from the top

8-0	
6-8	
4-6	
2-4	
0-2	
8-0	
6-8	
4-6	✓
2-4	
50-2	✓
8-0	
6-8	✓
4-6	✓
2-4	✓
0-2	✓
8-0	✓
6-8	✓
4-6	
2-4	
30-2	
8-0	
6-8	
4-6	
2-4	
0-2	

NOISE
LEVEL
(dBA)

10

20

30

40

50

NUMBER OF OCCURRENCES

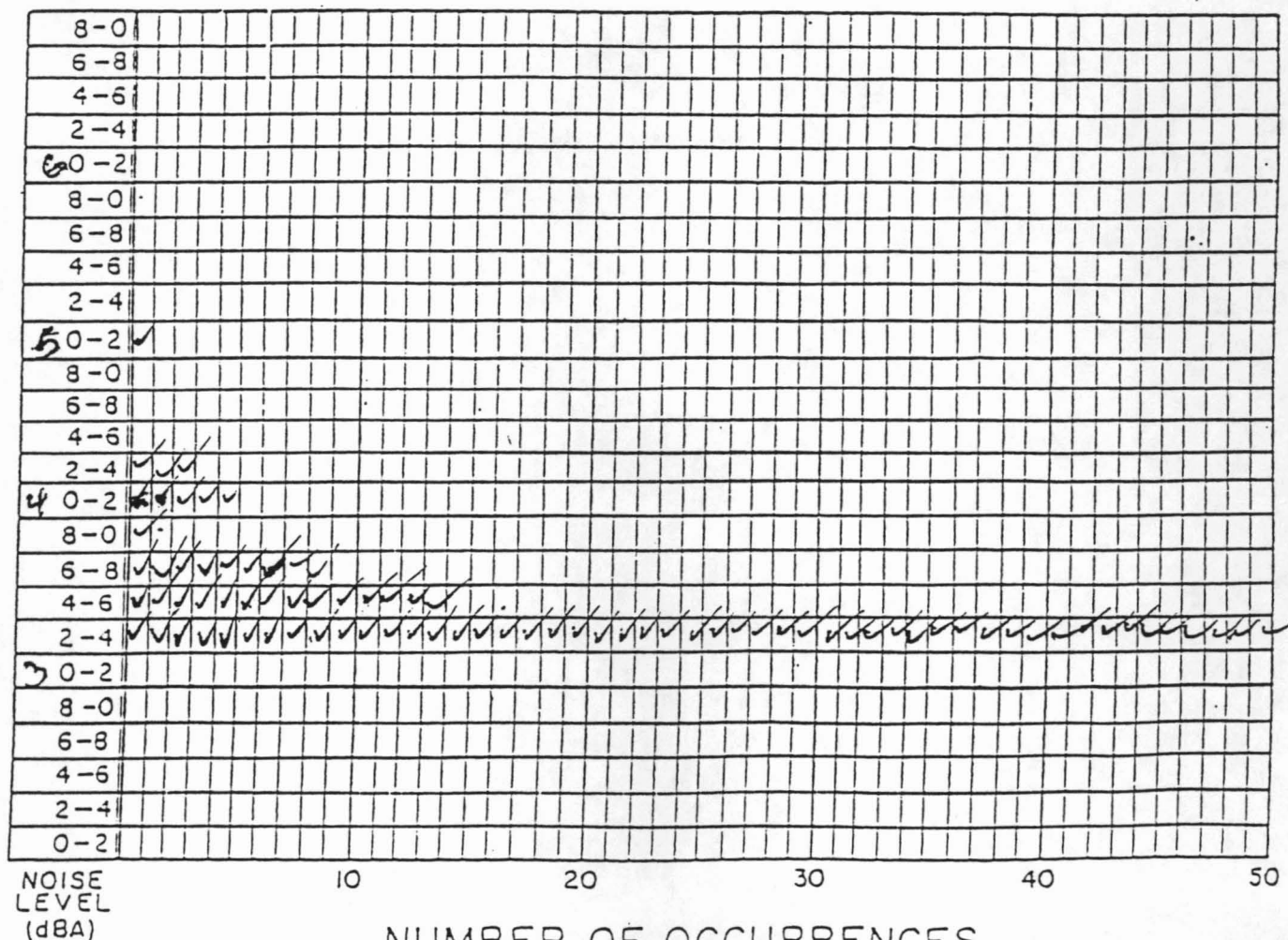
AMBIENT NOISE SURVEY DATA SHEET

POSITION: SOH
 ENGINEER: Kecity
 DAY OF WEEK: Wed DATE: 7-18-90 TIME: BEGIN 0550 JOB NO. 0559
 CAL: BEGIN 0559 FINISH: 0559
 NOTES AND SKETCH: Came field ed 300 ft from
SOH motors clearly audible. Pommerunk.
 SKY: overcast
 WIND: LSN
 dBA L₁₀:
 LIMITS, dBA:

→ 34 db
 Carson Hwy 40 db. 1/2
 Some trucks 50+ db.
 raining hard 5-5:30
 Crest of hill/Rig not visible.

Total # Samples	Upper Limit	L ₁₀	Lower Limit
50	1st	5th	10th
100	5th	10th	17th
150	8th	15th	23rd
200	12th	20th	29th
250	16th	25th	35th
300	20th	30th	41st
350	25th	35th	47th

sample from the top



Public Contact Sheet

First Contact: answering service ☒
mobile phone ☐
walk-in ☐
other ☐ Specify-

Date 7-25 Time 12:14 AM

Nature of contact: request for information ☐
complaint call ☒

Residents name: Bob Petricci
address :
phone number : 965-7471

Contacted by, _____ Date _____ time _____

Remarks:

Answering service referred this call to mobile phone
7-26-90 1030 Pm

Resident complained of Loud noise , difficult to sleep.
is writing formal letter of Complaint.

Action taken:

checked with rig operator - Referred to P. Wickland

For: SOH

initiated by R. Kocky
date 7-26-90

Public Contact Sheet

First Contact: answering service ☒
mobile phone ☐
walk-in ☐
other ☐ Specify-

Date 7-25-90 Time 0349 Am

Nature of contact: request for information ☐
complaint call ☒

Residents name: MRS. Pommerehne
address :
phone number : 916-5-8049

Contacted by, R. Kocay Date 7-26 time _____

Remarks:

Noise complaint. - referred to mobile phone 7-26-90 1030pm.

Action taken:

checked with Rig operator - reference to P. Wickland

For: SOH

initiated by R. Kocay
date 7-26-90

Public Contact Sheet

First Contact: answering service
mobile phone
walk-in
other

☒ to mobile phone.
☐
☐
☐ Specify-

Date 7-26-90 Time 1025 PM

Nature of contact: request for information ☐
complaint call ☒

Residents name: Mrs. Pommernik
address :
phone number : 965. 8049

Contacted by, _____ Date _____ time _____

Remarks:

Night time noise Complaint.

Action taken:

7-27-90 night time Noise Level check - canfield between
Pommernik and rig - 0100 0130 (see sheet)

For: SCH

initiated by R. Kocik
date 7-28-90

AMBIENT NOISE SURVEY DATA SHEET

POSITION: Kelly - STH

ENGINEER: 7-27-90

DAY OF WEEK: Friday

DATE: Friday

TIME: BEGIN 0100

CAL: BEGIN

JOB NO.

FINISH: 0120

FINISH:

SKY: clear

WIND: N-NW 25

dba L₁₀:

LIMITS, dbA:

NOTES AND SKETCH:

0100 - very little wind - NW 25

(some field - crest - STH in view - from meadow behind (300+ yds))

Cicada 40db - (50' from meter)

STH audible motor running

Rig - Running 37db - No Cicada

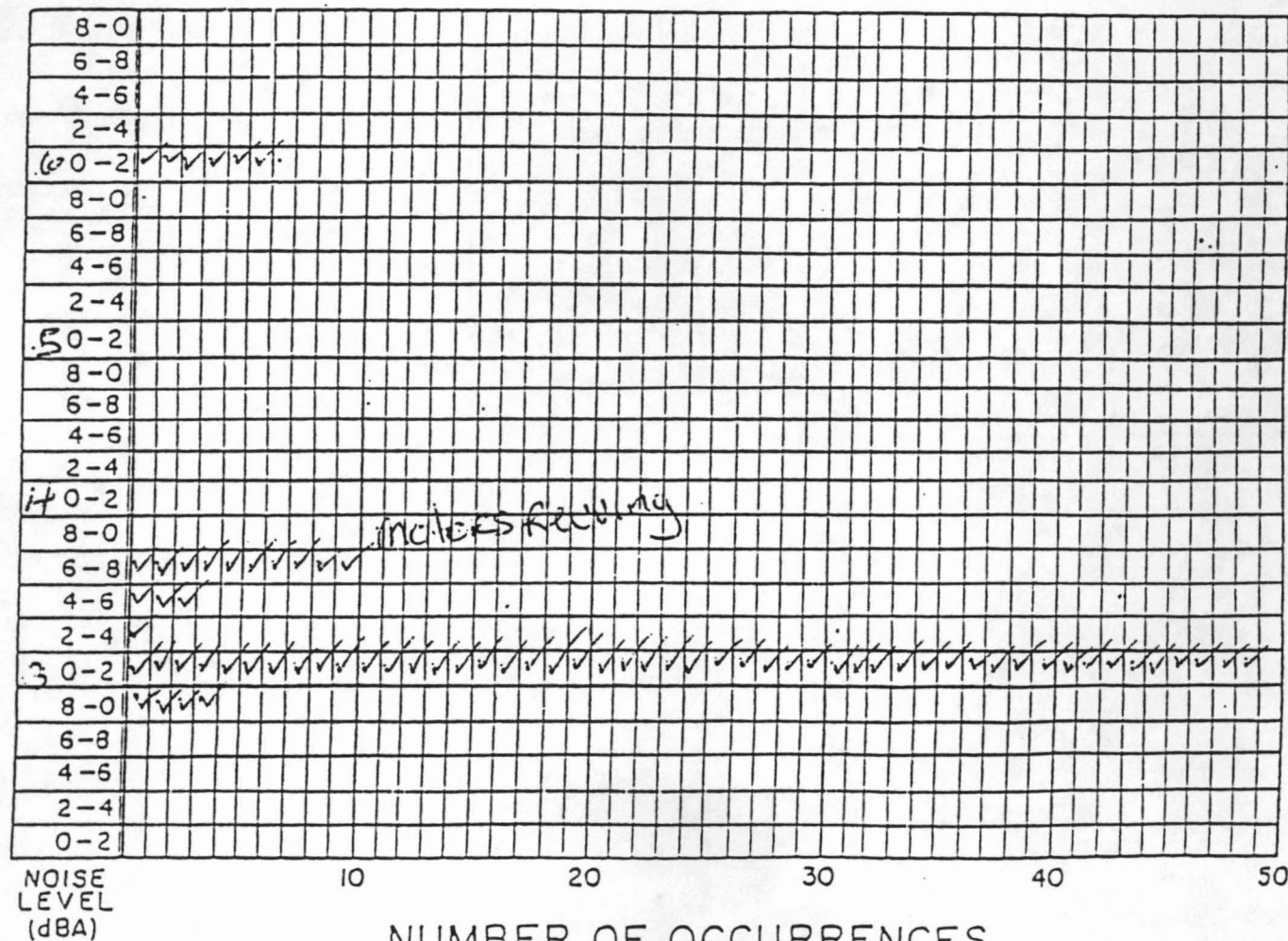
Rig - not running - 30db - 31db

Ocean surf clearly audible

Still you can hear Rig operators talking

Total # Samples	Upper Limit	L ₁₀	Lower Limit
50	1st	5th	10th
100	5th	10th	17th
150	8th	15th	23rd
200	12th	20th	29th
250	16th	25th	35th
300	20th	30th	41st
350	25th	35th	47th

sample from the top



NUMBER OF OCCURRENCES

POSITION: Jr. R. Kocity
ENGINEER:
DAY OF WEEK: Friday DATE: 7-27-90 TIME: BEGIN 0148
CAL: BEGIN

JOB NO. _____
FINISH: 015G
FINISH: _____
SKY: _____
WIND: _____
dBA L_{10} : _____
LIMITS, dBA: _____

NOTES AND SKETCH:

Patricci's + Dog barking 52-55 Callmax
SOL motor clearly audible.

Dog barked the whole time &
 was paired. - 100' past his
 driveway. - Go to next street.
 Dog 48 ab - 0156 - 205 paw
 (Dog barked the whole time)

Total # Samples	Upper Limit	L_{10}	Lower Limit
50	1st	5th	10th
100	5th	10th	17th
150	8th	15th	23rd
200	12th	20th	29th
250	16th	25th	35th
300	20th	30th	41st
350	25th	35th	47th

sample from the top

[illegible]

NOISE
LEVEL
(dBA)

NUMBER OF OCCURRENCES

AMBIENT NOISE SURVEY DATA SHEET

POSITION: SOH
ENGINEER: R. Kocott

DAY OF WEEK: Sunday DATE: 7-29-90 TIME: BEGIN 0900
CAL: BEGIN _____

JOB NO. _____
FINISH: 0940
FINISH: _____
SKY: Clear
WIND: light/trade
dBA L₁₀: _____
LIMITS, dBA: _____

NOTES AND SKETCH:

Hookupu + Kahukai (Pohukai) 3 telephone poles away.

SOH motors running - 34 db.

Cars on Pohukai Rd. - 34 db - 38

* SOH 32-37 depending on wind (one spike to 43 db)

wind on meter 40 db.

passing car 60 db +, 70 db +, 74 db.

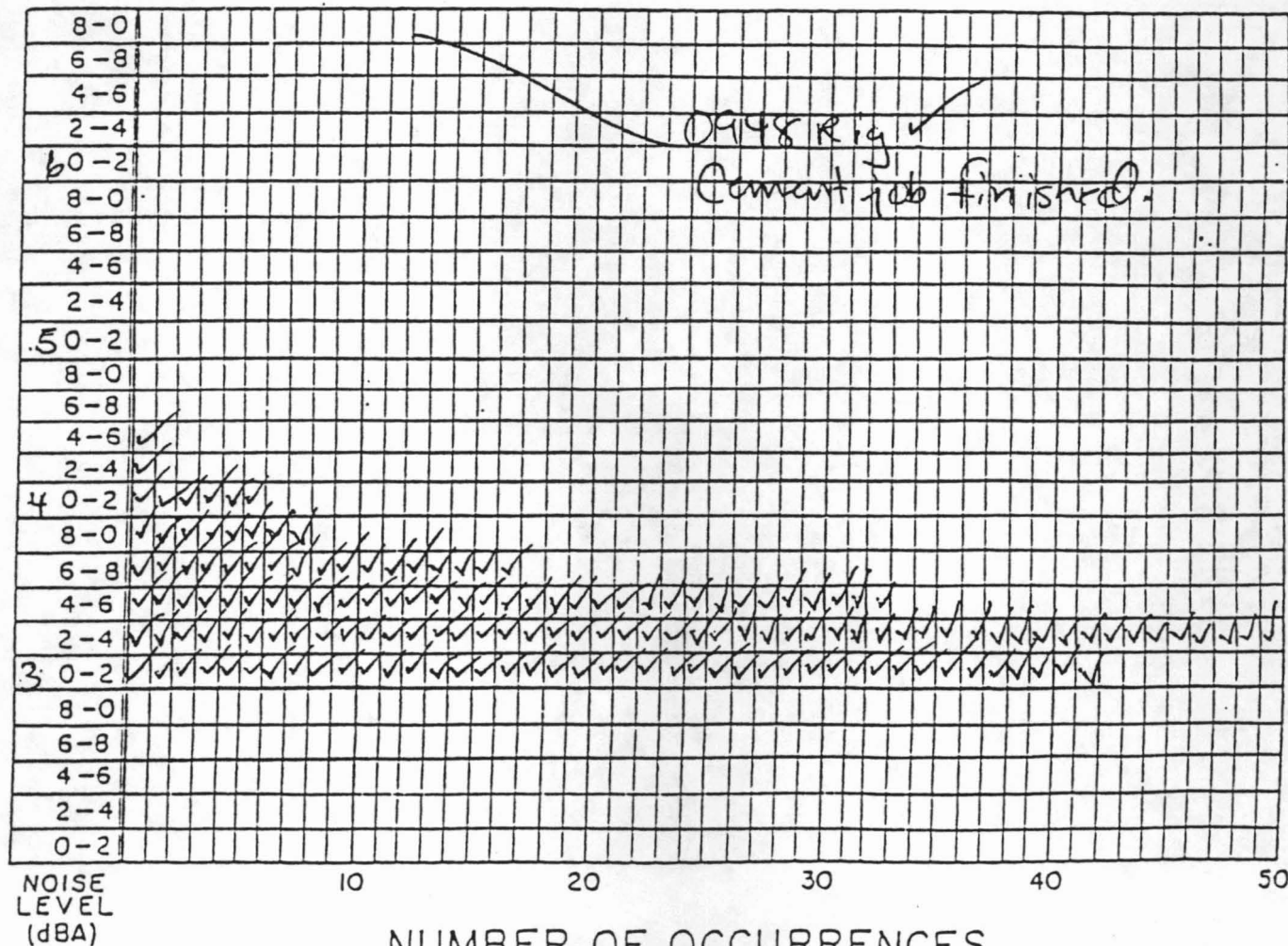
people raking in nearby driveway: 35-37

Bird chirp - 46 db

Airplane fly over 47 db. 0923

Total # Samples	Upper Limit	L ₁₀	Lower Limit
50	1st	5th	10th
100	5th	10th	17th
150	8th	15th	23rd
200	12th	20th	29th
250	16th	25th	35th
300	20th	30th	41st
350	25th	35th	47th

sample from the top



AMBIENT NOISE SURVEY DATA SHEET

POSITION: 501+

ENGINEER: Kcct-1

DAY OF WEEK: Sunday DATE: 7-29-90 TIME: BEGIN 0832

JOB NO. _____

FINISH: 0840

CAL: BEGIN _____ FINISH: _____

NOTES AND SKETCH: 4-1

SKY: Clear Ptly cldy

WIND: trade $\angle 10^\circ$

dB A L_{10} : _____

LIMITS, dBA: _____

same field.

Wind moving cane 35-37 db

cant hear soft motors

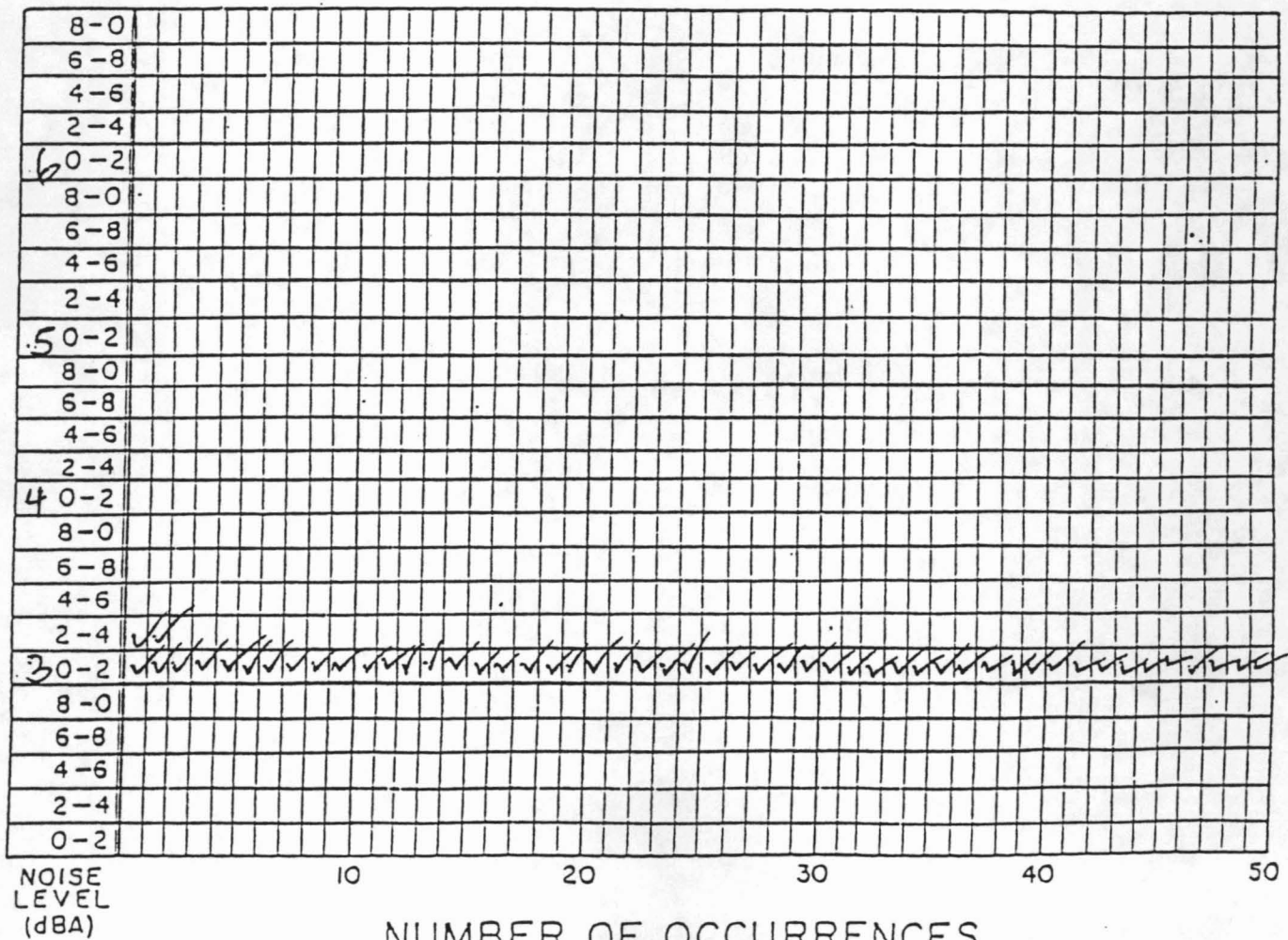
30-32 db very still, no cane moving

Rig chare 6840 meters Running
Halliburton + Rig = 66cb.

Halliburton + Rig = 66db.

Total # Samples	Upper Limit	L ₁₀	Lower Limit
50	1st	5th	10th
100	5th	10th	17th
150	8th	15th	23rd
200	12th	20th	29th
250	16th	25th	35th
300	20th	30th	41st
350	25th	35th	47th

sample from the top



Public Contact Sheet

First Contact: answering service ☐
mobile phone ☒ - direct call
walk-in ☐
other ☐ Specify-

Date 7-31-90 Time 1040pm

Nature of contact: request for information ☐
complaint call ☒

Residents name: Mrs. Pommerehne
address :
phone number : 965-8049

Contacted by, Kochy Date Same time Same

Remarks:

"Noise Really bad; woke child up, something must be wrong, drill rig number busy."

Action taken:

Went to canefield 1103pm took noise level measurements
stopped by Rig. Tripping the hole prior to 1030pm.
11pm - drilling.

For: SOH

initiated by R. Kochy
date 8-1-90

AMBIENT NOISE SURVEY DATA SHEET

Calibration: 2338 100-40 db 11st + 1db high
Site: 2345 - trapping in hole prior to 1030pm

POSITION: Sett
ENGINEER: Kalt

DAY OF WEEK: Tues DATE: 7-31-90 TIME: BEGIN 2305 JOB NO. _____
FINISH: 2336
CAL: BEGIN _____ FINISH: _____

NOTES AND SKETCH:

SKY: partly
WIND: E-SE 10-15
dBA L₁₀: _____
LIMITS, dBA: _____

Cameled - power window complaint rec'd 2310 hrs

cc cane Hwy 41 db - 46 db

Cricket nearby 37 db - 40 db

Sett audible - no wind (no cane movement)

Total # Samples	Upper Limit	L ₁₀	Lower Limit
50	1st	5th	10th
100	5th	10th	17th
150	8th	15th	23rd
200	12th	20th	29th
250	16th	25th	35th
300	20th	30th	41st
350	25th	35th	47th

30-32 db - chisel motor running - no revving.

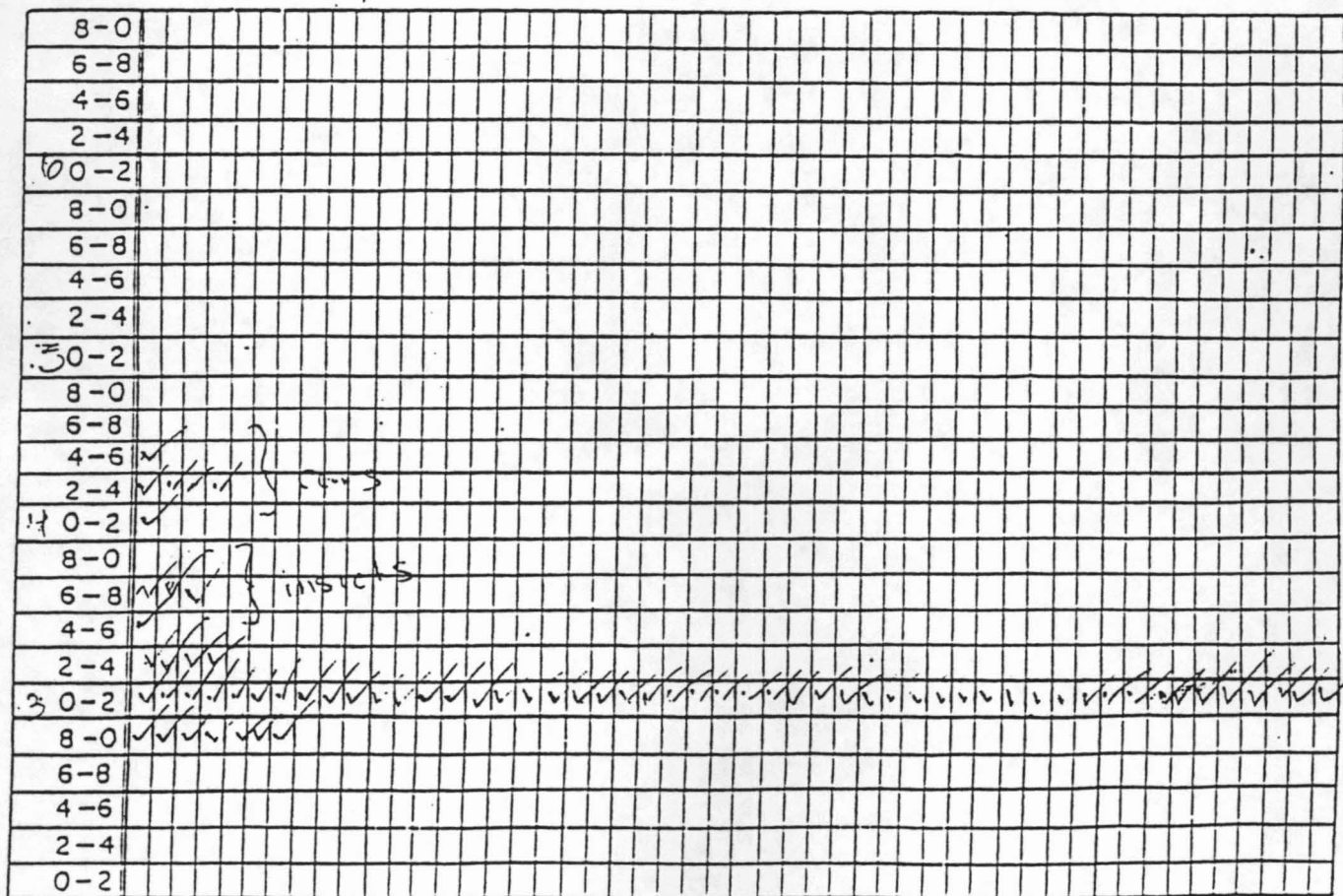
Cicada nearby 46 db

* momentary spike (one) Sett (fast speed) 35 db

Cane from 2330 - 32 db

Sett 30 min Avg. 32-33 db

sample from the top



NOISE
LEVEL
(dBA)

10

20

30

40

50

NUMBER OF OCCURRENCES

Public Contact Sheet

First Contact: answering service 0
mobile phone 0 ☒ direct call
walk-in 0
other 0 Specify-

Date 8-2-90 Time 0640

Nature of contact: request for information 0
complaint call 0 ☒

Residents name: Greg Pommeroy
address :
phone number : 965-8049

Contacted by, SOCH Date Same time Same.

Remarks:

Resident wanted to know if it was his imagination or
was rig operation getting louder?

Action taken:

9 min. mobile convers. - operation normal - discussed night time
noise level measurements, low decible readings.

For: SOH

initiated by P. Kocik

date 8-3-90

Public Contact Sheet

First Contact: answering service ☒ to mobile phone.
mobile phone ☐
walk-in ☐
other ☐ Specify-

Date 8-10-90 Time 0245

Nature of contact: request for information ☐
complaint call ☒

Residents name: Mrs. Pommernick
address :
phone number : 965-8049

Contacted by, R. Kochy Date 8-11-90 time 1145 Am

Remarks:

"SOH drilling woke her family up"

Action taken:

Rig check 0830, operation normal - drilling.
Submitted rig copy. Wind last night N-NW and
a little more than usual. (est 5-7 mph).

For:

SOH

initiated by R. Kochy

date 8-17-90

Public Contact Sheet

First Contact: answering service
2nd " mobile phone
walk-in
other

☒ to mobile 1030 pm
☒ dir. to mob. 1040 pm.
☐
☐ Specify-

Date 8-11-90 Time 1030 pm

Nature of contact: request for information ☐
complaint call ☒

Residents name: Mrs. Pommernik
address :
phone number : 965-8049

Contacted by, R. Kochy Date 8-11-90 time 1145 Am

Remarks:

"Children crying from SOT noise - she claims 46 db at house.
over 45 db night time limit.

*It was Raining at the time of her call.

Action taken:

Went to Canefield adjacent Pommernik property 1047 pm
took 3 sheets of Noise level measurements (attached).

For:

SOT

initiated by R. Kochy

date 8-13-90

AMBIENT NOISE SURVEY DATA SHEET

POSITION: 5th
ENGINEER: Koruy
DAY OF WEEK: Sat

DATE: 8-11-90

TIME: BEGIN 2247

JOB NO. _____

FINISH: 2311

CAL: BEGIN _____

FINISH: _____

NOTES AND SKETCH:

SKY: overcast - rain

WIND: N-NE 8-10 just

dB A L₁₀: _____

LIMITS, dB A: _____

Complaint (Call Recd) 1030 pm
to mobile 1040 pm

Car on Rd. 44 db

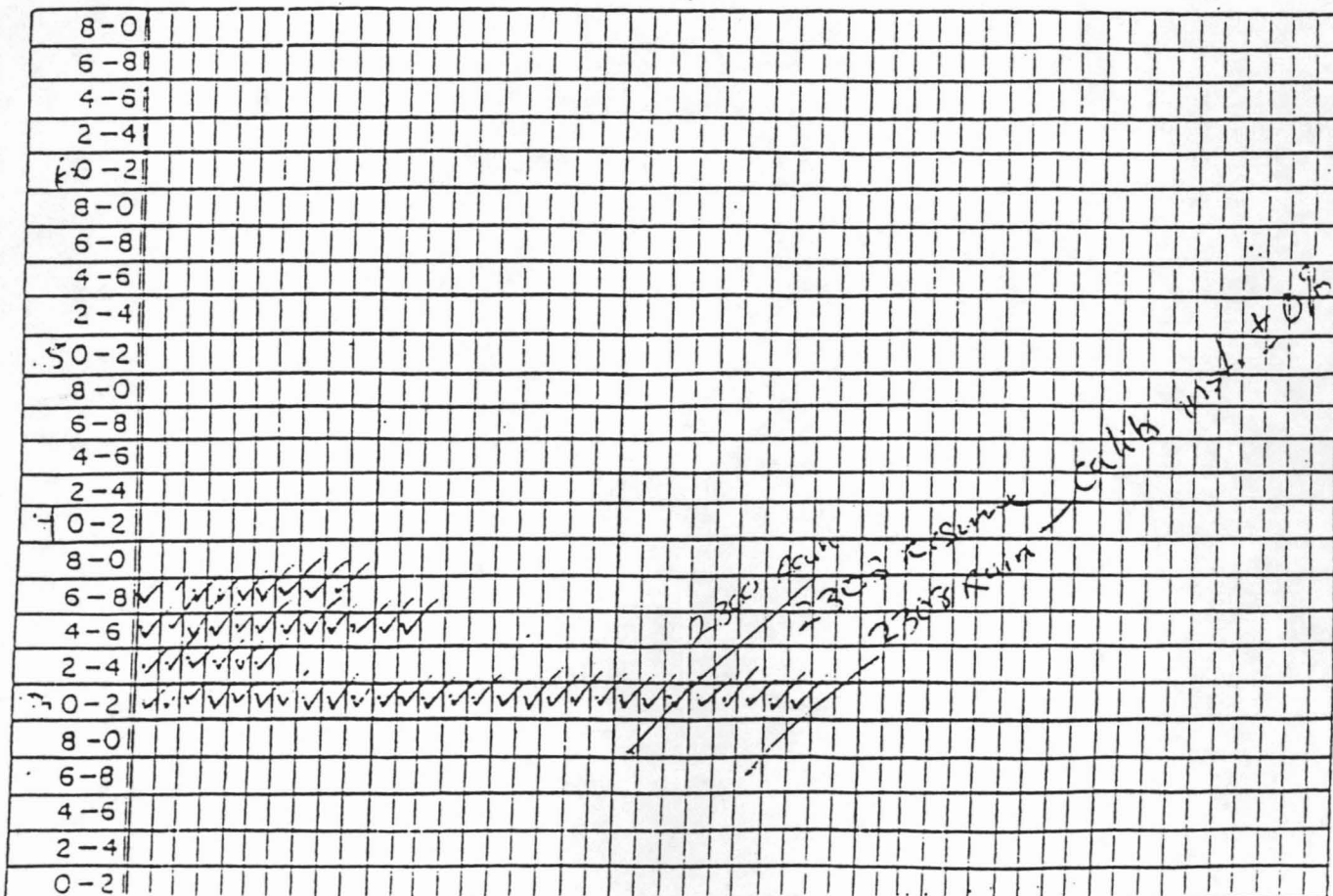
Lawmower (Electric) running 33db-35

Drilling? - loudest = 37. 25 hrs.

Reinforced roof 45 db-52-64

sample from the top

Total # Samples	Upper Limit	L ₁₀	Lower Limit
50	1st	5th	10th
100	5th	10th	17th
150	8th	15th	23rd
200	12th	20th	29th
250	16th	25th	35th
300	20th	30th	41st
350	25th	35th	47th



NOISE
LEVEL
(dB A)

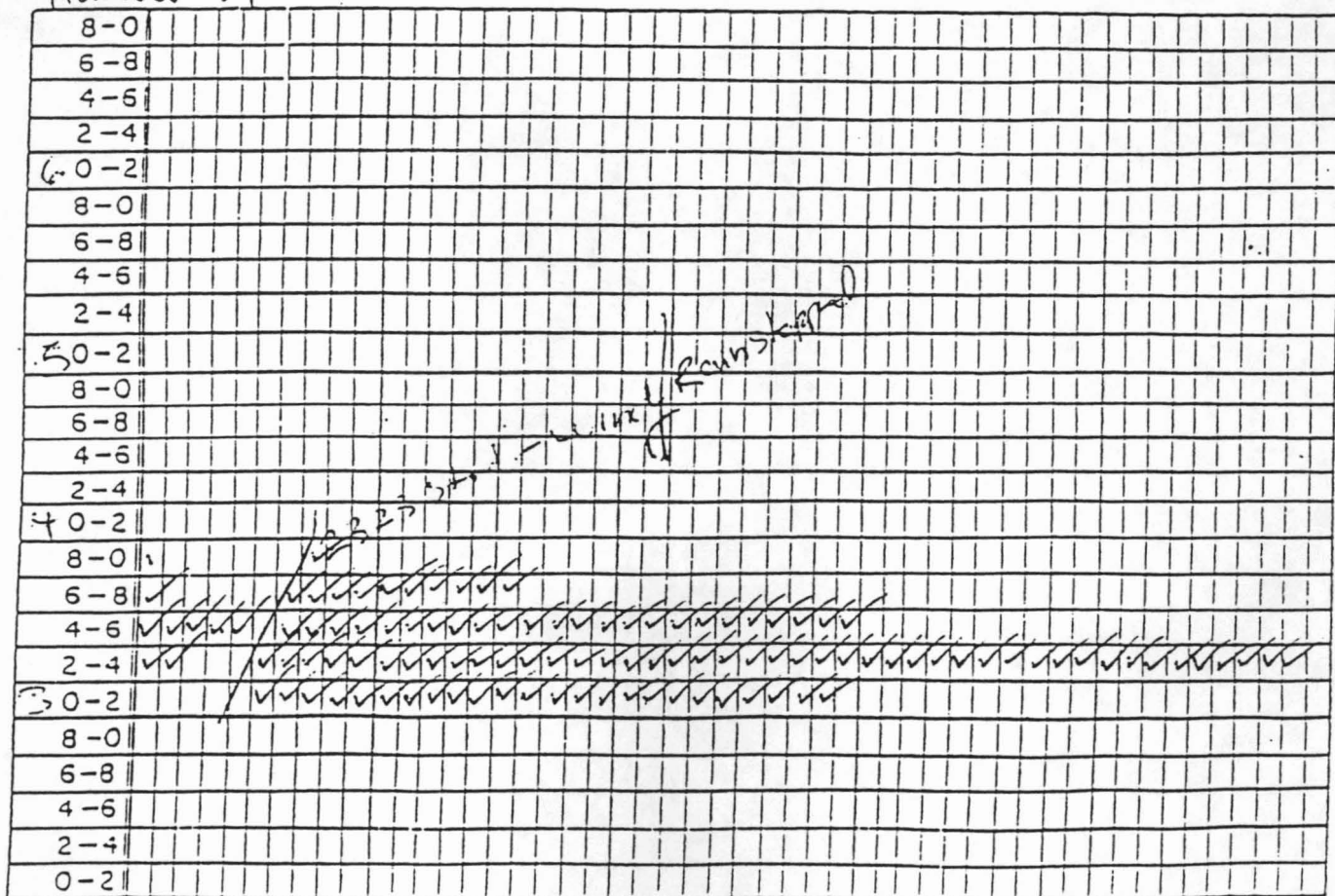
NUMBER OF OCCURRENCES

AMBIENT NOISE SURVEY DATA SHEET

POSITION: Soil
 ENGINEER: Kerry
 DAY OF WEEK: Sat DATE: 8-11-78 TIME: BEGIN 2319 FINISH: 2335
 CAL: BEGIN _____ FINISH: _____
 JOB NO. _____
 NOTES AND SKETCH: PC noise - rock / concrete field
2311 hrs - waiting for rain to stop
2318 - windows rolled up training I can hear
cows on Hwy. -
2319 start / 2320 stop
37 Wind No Set
No wind max Set 37
Cow on R.C. 40
Hammer 37
2334 - crickets starting 35db
 SKY: Overcast - rain
 WIND: trade SW to gusts
 dBA L₁₀: _____
 LIMITS, dBA: _____

Total # Samples	Upper Limit	L ₁₀	Lower Limit
50	1st	5th	10th
100	5th	10th	17th
150	8th	15th	23rd
200	12th	20th	29th
250	16th	25th	35th
300	20th	30th	41st
350	25th	35th	47th

sample from the top



NOISE
LEVEL
(dBA)

10

20

30

40

50

NUMBER OF OCCURRENCES

7

NUMBER OF OCCURRENCES

Public Contact Sheet

First Contact: answering service 0
mobile phone 0 ✓ direct call
walk-in 0
other 0 Specify-

Date 8-28-90 Time 0656

Nature of contact: request for information 0
complaint call 0 ✓

Residents name: Mrs. Pommerenik
address :
phone number :

Contacted by, R. Keady Date Same time Same.

Remarks:

"SOH very loud last night" (3Am)
called rig, explanation was they were "stripping, or
stringing pipe". She says Harry Olsen told her they
werent going to change bits.

Action taken:

She asked me to log complaint.

For: SOH

initiated by R. Keady
date 8-29-90

Public Contact Sheet

First Contact: answering service ☐
mobile phone ☒ direct
walk-in ☐
other ☐ Specify-

Date 8-28-90 Time 0715

Nature of contact: request for information ☐
complaint call ☒

Residents name: Steve Philips
address: Kupono St. Leilani Est.
phone number:

Contacted by, R. Kochy Date Same time Source

Remarks:

"wake up and noticed SOH noise last night,
after midnight"
Claims he's been trying to hear it"

Action taken:

Wanted "formal" complaint filed

For:

SOH

initiated by R. Kochy
date 8-29-90

Public Contact Sheet

First Contact: answering service ☐
 mobile phone ☒ direct call
 walk-in ☐
 other ☐ Specify-

Date 8-28-90 Time 2326 hrs.

Nature of contact: request for information ☐
 complaint call ☒

Residents name: Steve Philips
 address :
 phone number :

Contacted by, R. Keedy Date Same time Same

Remarks:

"I can hear SOH right now in my house"

Action taken:

I asked him if he wanted noise level measurement taken - he declined.
 Wanted to file complaint only.

For:

SOH

initiated by R. Keedy
 date 8-29-90

11

Public Contact Sheet

First Contact: answering service ☐
mobile phone ☒ direct call
walk-in ☐
other ☐ Specify-

Date 9-3-90 Time 1620

Nature of contact: request for information ☐
complaint call ☒

Residents name: Steve Philips
address : Kupono St. Leilani Est.
phone number :

Contacted by, R. Kachy Date 9-3 time same

Remarks:

"Woke up at 3am and heard SOH"

Action taken:

Rig noise did not wake him up, he got up to use
bathroom and heard rig"

For:

SOH

initiated by R. Kachy

date 9.4-90

Public Contact Sheet

First Contact: answering service ☐
mobile phone ☒ Direct call
walk-in ☐
other ☐ Specify-

Date 9-7-90 Time 355 AM

Nature of contact: request for information ☐
complaint call ☒

Residents name: MRS. Pammerank
address :
phone number :

Contacted by, Kochy Date Same time Same

Remarks:

" SOH is really noisy "
" Louder than 45 db right now "
" Rig phone not working, must be something wrong "

Action taken:

Wind gusting at time of call est. 8-10 + N-NW

For:

SOH

initiated by R. Kochy
date 9-7-90

Public Contact Sheet

First Contact: answering service ☐
mobile phone ☒ direct call
walk-in ☐
other ☐ Specify-

Date 9-24-90 Time 0900

Nature of contact: request for information ☒
complaint call ☐

Residents name: Mrs. Pommernik
address :
phone number :

Contacted by, R. Kochy Date 9-25 time 1230

Remarks:

Mrs. Pommernik wanted to know if Noise level meter
was going to be reinstalled at her house.
Claims SOH Noise waives children 3 times per week.

Action taken:

Called Bill Burkhard - inst. will be reinstalled when
Rain shelter is completed.
Left message at Mrs. Pomm. phone.

For:

SOH

initiated by R. Kochy
date 9-25-90

Public Contact Sheet

First Contact: answering service ☐
mobile phone ☒ *Discussed*
walk-in ☐
other ☐ Specify _____

Date 9-26-90 Time 0610

Nature of contact: request for information ☐
complaint call ☒

Residents name: _____
address: *MRS. Pommern*
phone number: _____

Contacted by: *R. Keeney* Date 9-27-90 Time _____

Remarks:

"SOH really noisy last few days"
"Noise wakes children at least 3 or 4 times a week"

Action taken:

For:

SOH

Initiated by *R. Keeney*
date *9-27-90*

Public Contact Sheet

First Contact: answering service
mobile phone
walk-in
other

☒ called me
☒ called direct
☐
☐ Specify-

Date 9-28-90 Time 0900

Nature of contact: request for information ☐
complaint call ☒

Residents name: Steve Philips
address :
phone number : Leilani Est.

Contacted by, R. Kocik Date 9-28 time 0905

Remarks:

"SOH unusually loud last night 3:30-4:30 Am"

Requested noise level baseline data (SOH not running)

He wants to know how quiet it is (" " ")

Would like to know if SOH was within limits last night.

Action taken:

Told him noise level measurements would be available
when monthly report came out

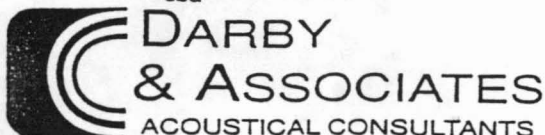
For:

SOH

initiated by R. Kocik
date 9-28-90

APPENDIX C

NOISE COMPLAINT ANALYSIS -- SOH 1



#89-10
July 30, 1990

Mr. Art Seki
University of Hawaii
Hawaii Natural Energy Institute
2540 Dole St., Holmes Hall #206
Honolulu, Hawaii 96822

Subject: Noise Complaint Evaluations on July 5, 9, and 15, 1990
SOH #1 - SOH Program, Puna, Hawaii

Dear Mr. Seki:

Our report dated July 30, 1990 provided a summary of noise level data recorded from April 1, 1990 to June 30, 1990. Two automatic noise monitoring stations have been in operation since June 30, 1990, and also selected manual noise level measurements have been made by Steve Avery and Robert Kochy. A summary report is forthwith coming. This letter represents responses to four specific noise complaints by the Pommerenks and Mr.

Petricci:

1. Noise Complaint on July 5, 1990 - The contact sheet states that Debbie Pommerenk left a message: "noisy tonight at drill site." The meteorological records show that the Pommerenk residence was downwind of the rig on July 5th from midnight to about 8 am, as well as from about 10 pm to midnight. Continuous noise levels were typically 63 dBA at the rig with transients ranging from 80 to 92 dBA. These conditions could have caused continuous levels at the residence of about 39 dBA, with

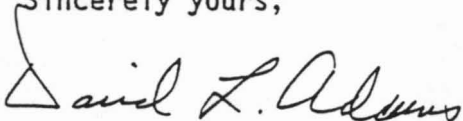
temporary peaks of 49 dBA if focussing occurred. Transient peak noise levels ranging from 46 to 68 dBA theoretically may have been experienced. The limit of 45 dBA for 10% of the time may, or may not, have been exceeded during periods of temporary focusing.

2. Noise Complaint on July 9, 1990 - The contact sheet stated that Greg Pommerenk asked Robert Kochy to call him, presumably about noise. There is some confusion with respect to the contact sheet in that the Drilling Reports show that the rig was down due to a failure in the drive train from 9 am on July 8th to 9 pm on July 10th. The strip chart recorder stopped also during this time, indicating the generator was also probably down. The weather data indicates that at night the Pommerenk residence was downwind at times, but there should have been little activity at the rig site.
3. Noise Complaints on July 15, 1990
 - (a.) The contact sheet states that Greg Pommerenk "complained of night time noise, different sound." Analysis of the Drilling Report and the noise chart at the rig indicates that about 2 am the hole was cemented followed by a quiet 2 hour period waiting for the cement to set, and then drilling of the cement commenced and continued apparently until about 6 pm. Also the auxiliary mud pump next to the drill rig was used for the first time at this site. These operations may account for the mention of a "different sound." The Pommerenk residence was downwind most of the night, including at

the time of the complaint. Continuous noise levels to 68 dBA at the rig imply levels at the residence of 34 dBA with peaks of 44 dBA if focussing occurred. The County noise guidelines should not have been exceeded based on this analysis.

- (b.) The contact sheet shows that Bob Petricci also called at 7:52 pm. The meteorological data indicate that the Petricci residence was upwind during the early morning hours, but was mostly downwind during the day time. Thus, during the day, steady noise levels of about 40 dBA could have occurred with temporary peaking to 50 dBA if there was focusing. The limit of 45 dBA for 10% of the time may, or may not, have been exceeded during periods of temporary focusing.

Sincerely yours,

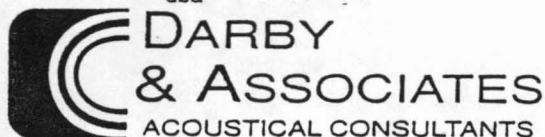


David L. Adams, P.E.



Mike S. Lee

DAL/MSL:msl



#89-10
October 12, 1990

University of Hawaii
Hawaii Natural Energy Institute
Holmes Hall #206
2540 Dole Street
Honolulu, Hawaii 96822

Attention: Mr. Art Seki

Subject: Summary Of Noise Monitoring Efforts From
July 1, 1990 Through September 30, 1990

Dear Mr. Seki:

Our report dated July 30, 1990 provided a summary of noise level data recorded from April 1, 1990 to June 30, 1990. Following is a summary of noise monitoring efforts performed from July 1, 1990 to September 30, 1990.

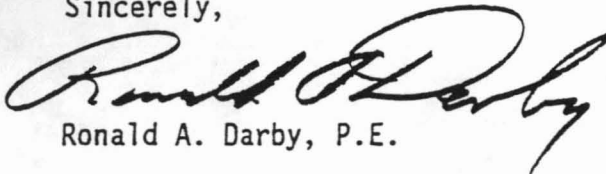
- A. Overall Noise Monitoring - Table I is a summary of monitoring activities indicating that environmental noise monitoring has been performed at a total of three locations for a total of about 200 days on-line over a three month period. There are now three automated noise monitoring stations (described as "A," "B," and "C,") which are serviced by Alpha-Micro Systems of Hilo. Also, Robert Kochy has performed numerous manual noise level surveys in response to specific complaints during this time period.

On August 6, 1990, monitoring station "C" was set up at the Pommerenk residence. Subsequently, the Pommerenks were provided a tape recorder so we could hear the sounds that they heard. However, to my knowledge, no meaningful information was obtained from the tape recordings which were played back by Bill Burkhardt of Alph-Micro Systems. On September 10, 1990, the tape recorder was ruined due to rain. Also, on that date the instrumentation at station "C" also got extremely wet and was inoperable, but has since been repaired.

- B. Evaluation of Specific Noise Complaints - Tables II through IV provide a summary of the evaluations made based on Public Contact Sheets provided to us for this quarter. The report dated July 30, 1990 explained the process used to evaluate noise complaints. From the tables, the sound propagation condition can be estimated by noting whether the complainant was downwind, upwind, or in a "transitional" condition (e.g., crosswind).

The Public Contact Sheet for Complaint No. 5 on Table IV by Steve Philips requests noise level measurements for the night of September 28, 1990. Unfortunately, the chart paper was jammed at Station A for that time period. However, based on (a) the hundreds of hours of data obtained when similar drilling operations were taking place; (b) the fact that there is at least one-mile distance to the Philips residence, and (c) that there was a crosswind (transitional) condition--it can be said that there is the highest probability that the geothermal guidelines were not exceeded.

Sincerely,



Ronald A. Darby, P.E.

RAD/lid

Enclosures

Table I - Summary of Noise Monitoring Activities from 7/1/90 to 9/30/90

Location	Mon. Sta.	Data Set	Start Date	Stop Date	Days on Line	Remarks
SOH #1	A	20a	7/1	7/16	15	Rig down from 7/8 to 7/11
Loughlin	B	20b	6/29	7/16	15	Pen dried 7/3 to 7/6
SOH #1	A	21a	7/16	8/1	15	26 hours total of data lost
Loughlin	B	21b	7/16	7/30	15	
Loughlin	B	21c	7/30	8/1	2	
SOH #1	A	22a	8/1	8/13	12	10 hours total of data lost
SOH #1	A	22b	8/13	8/15	2	
Loughlin	B	22c	8/1	8/15	14	
Loughlin	B	23c	8/15	8/17	2	Station down for main- tenance 8/17 to 8/20
Loughlin	B	23d	8/20	8/27	7	Bad data 8/24 to 8/27. Station down 8/27 to 8/31. Repair
SOH #1	A	23a	8/15	8/27	2	Chart jam 8/20 to 8/24
Pommerenk	C	22d	8/6	8/13	7	Chart jam
Pommerenk	C	22e	8/13	8/15	2	Chart jam
Pommerenk	C	23f	8/15	9/3	20	
SOH #1	A	23b	8/27	9/3	8	

Table I - Summary of Noise Monitoring Activities from 7/1/90 to 9/30/90

Location	Mon. Sta.	Data Set	Start Date	Stop Date	Days on Line	Remarks
SOH #1	A	24a	9/3	9/12	9	Paper tore 9/10
SOH #1	A	24b	9/12	9/14	2	Pen ran dry
SOH #1	A	24c	9/14	9/17	3	
SOH #1	A	25a	9/17	10/1	14	Intermittent paper jams
Loughlin	B	23e	8/31	9/3	3	
Loughlin	B	24a	9/3	9/12	9	
Loughlin	B	24b	9/12	9/14	2	
Loughlin	B	24c	9/14	9/17	3	
Loughlin	B	25a	9/17	10/1	14	Paper jam
Pommerenk	C	24f	9/3	9/10	7	Paper jam 8/27 to 8/29; Sta- tion Flooded

TABLE II - SUMMARY OF NOISE COMPLAINTS FROM SOH #1 AND EVALUATIONS FOR THE MONTH OF JULY, 1990

No.	Date (Time)	Complaint	Complaint's Comment	Rig Operation	Rig Level	Met Condition	Comments & Evaluation
1	7/7/90 (0820)	D. Pommerenk	Woke up at 4 am	Open 4" hole to 8-1/2"	69-70 dB Steady >1 hour	Overcast. Downwind. 5 \pm 1 mph	Kochy: SOH audible. 34 dB 300 yds from SOH. No exceedances likely
2	7/19/90 (0635)	G. Pommerenk	Nighttime noise	As above. Tripped pipe in and out.	69 dB exceeds for only very short periods	Mainly transi- tional winds; some downwind <5 mph	Audible, but no exceedances.
3	7/23/90 (0224)	D. Pommerenk	Rig woke her up	Open 4" hole to 8-1/2"	No data available	Downwind & transitional	Cannot evaluate due to lack of SOH data.
4	7/23/90 (1030)	D. Pommerenk	Really loud and annoying	As above.	<66 dB Steady Few transients	Primarily transitional	No exceedances.
5	7/25/90 (0014)	R. Petricci	Loud noise. Difficult to sleep	As above.	<63 dB Steady Few transients	Downwind & transitional <5 mph	No exceedances.
6	7/26/90 (2225)	D. Pommerenk	Nighttime noise	Cable broke	Many transients >69 dB	Downwind & transitional <5 mph	Predictably audible. Kochy measured 37 dB when revving. No violation due to temporal aspect.
7	7/29/90 (0900)	R. Petricci	-	"Fishing"	Transients 50-64 dB	Downwind 3-7 mph	Kochy: Inaudible, or 32-37 dB. No exceedances.
8	7/31/90 (1040)	D. Pommerenk	Noise really bad. Woke child up.	Tripping to 2200	During day transients to 85 dB	Upwind 4-10 mph	Kochy: SOH audible. 30-32 dB drilling at 2305. No violation due to temporal aspect.

TABLE III - SUMMARY OF NOISE COMPLAINTS FROM SOH #1 AND EVALUATIONS FOR THE MONTH OF AUGUST, 1990

No.	Date (Time)	Complaint	Complaint's Comment	Rig Operation	Rig Level	Met Condition	Comments & Evaluation
1	8/2/90 (0640)	G. Pommerenk	Was rig getting louder?	Drilling with difficulties re bits ruined	<65 dB Steady Transients to 75 dB	Transitional & downwind <5 mph	No exceedances.
2	8/10/90 (0245)	D. Pommerenk	Woke her family up	Drilling cement and rock	<65 dB Steady Few transients <75 dB	Downwind & transitional <5 mph	No exceedances.
3	8/11/90 (2230)	D. Pommerenk	Children crying from SOH noise	Drilling & tripping	Many transients <70 dB	Downwind & transitional <5 mph (Rain)	Kochy: Max SOH spikes 35-37 dB. No exceedances.
4	8/28/90 (0656)	D. Pommerenk	Very loud at 3 am	Fishing/ream/ and tripping	Many transients @ 70 dB	Downwind 5 to 7 mph	No exceedances.
5	8/28/90 (0715)	Steve Philips (Leilani Estates)	Noticed SOH noise last night after midnight	Fishing/ream/ and tripping	Many transients @ 70 dB	Transitional 5 to 7 mph	No exceedances.
6	8/28/90 (2326)	Steve Philips (Leilani Estates)	Can hear SOH right now in my house	Reaming	56 dB Steady Few transients to 77 dB	Transitional <5 mph	No exceedances.

TABLE IV - SUMMARY OF NOISE COMPLAINTS FROM SOH #1 AND EVALUATIONS FOR THE MONTH OF SEPTEMBER, 1990

No.	Date (Time)	Complaint	Complaint's Comment	Rig Operation	Rig Level	Met Condition	Comments & Evaluation
1	9/3/90 (1620)	Steve Philips (Leilani Estate)	Heard rig at 3 am	Opening 4" hole Changed bit	Data lost Pen dried up	Transitional <5 mph	Cannot evaluate due to lack of SOH data.
2	9/7/90 (0355)	D. Pommerenk	Really noisy. Louder than 45 dB now - 3:55 am	Opening 4" hole Changed bit	58 dB Steady. Many transients @ 70 dB, few 70 to 75 dB	Downwind <5 mph	Predictably audible. No viola- tion due to temporal aspects.
3	9/24/90 (0900)	D. Pommerenk	Is noise monitor station to be installed?	N.A.	N.A.	N.A.	Kochy responded that it was to be installed soon.
4	9/26/90 (1610)	D. Pommerenk	Really noisy last two nights. Wakes children at least 3 times/week.	Coring	Night of 9/25: Max Steady Level -63 dB. A few transients. One to 78 dB. Chart jam - 9/26.	Downwind both nights <5 mph	Predictably audible. No viola- tion for morning of 9/25. Cannot evaluate early morning of 9/26.
5	9/28/90 (0900)	Steve Philips (Leilani Estates)	Unusually loud last night 3:30 to 4:30 am	Coring & tripping	Chart jam	Transitional 5 - 7 mph	Cannot evaluate due to lack of data. See text.

APPENDIX D
FINANCIAL REPORT

DBED \$3,000,000

AGREEMENT FOR A GEOTHERMAL RESOURCE DEVELOPMENT, HAWAII (RCUH 3908-00)

BUDGET CATEGORY	AMOUNT AWARDED	AMOUNT EXPENDED AS OF 9/28/90	AMOUNT ENCUMBERED	AVAILABLE BALANCE
Salaries	\$77,500.00	\$50,353.59	\$0.00	\$27,146.41
Fringe	\$20,000.00	\$5,786.91	\$0.00	\$14,213.09
Equipment	\$165,000.00	\$110,638.52	\$6,712.19	\$47,649.29
Supplies	\$350,500.00	\$355,007.02	\$22,372.91	-\$26,879.93
Travel	\$25,000.00	\$25,719.10	\$504.70	-\$1,223.80
Consultant	\$195,000.00	\$263,279.81	-\$110,627.91	\$42,348.10
Publications	\$0.00	\$0.00	\$0.00	\$0.00
Miscellaneous	\$142,000.00	\$177,960.70	\$8,466.20	-\$44,426.90
Indirect Costs	\$25,000.00	\$25,000.00	\$0.00	\$0.00
Drilling	\$2,000,000.00	\$1,704,271.53	\$290,259.17	\$5,469.30
TOTAL	\$3,000,000	\$2,693,017.18	\$217,687.26	\$64,295.56

